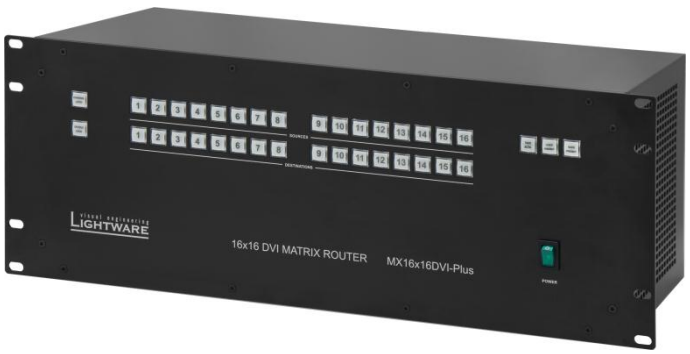
visual engineering
LIGHTWARE

MX16x16DVI-Plus
MX12x12DVI-Plus
MX9x9DVI-Plus



User's Manual

SAFETY INSTRUCTIONS

Class I apparatus construction. This equipment must be used with a main power system with a protective earth connection. The third (earth) pin is a safety feature, do not bypass or disable it.

This equipment should be operated only from the power source indicated on the product.

To disconnect the equipment safely from power, remove the power cord from the rear of the equipment, or from the power source. The MAINS plug is used as the disconnect device, the disconnect device shall remain readily operable.

There are no user-serviceable parts inside of the unit. Removal of the top cover will expose dangerous voltages. To avoid personal injury, do not remove the top cover. Do not operate the unit without the cover installed.

The apparatus shall not be exposed to dripping or splashing and that no objects filled with liquids, such as vases, shall be placed on the apparatus.

The apparatus must be safely connected to multimedia systems. Follow instructions described in this manual.

Replacing the AC fuse

Unplug the AC power cord from the equipment

Locate the AC fuse on the rear of the unit

Replace only the AC fuse as indicated on the rear panel of the unit: 3.15A fast blowing

Connect the power cord to the switcher and to the AC power source. Make sure the switcher is working properly.

WEEE (Waste Electrical & Electronic Equipment)

Correct Disposal of This Product

This marking shown on the product or its literature, indicates that it should not be disposed with other household wastes at the end of its working life. To prevent possible harm to the environment or human health from uncontrolled waste disposal, please separate this from other types of wastes and recycle it responsibly to promote the sustainable reuse of material resources.

Household users should contact either the retailer where they purchased this product, or their local government office, for details of where and how they can take this item for environmentally safe recycling.

Business users should contact their supplier and check the terms and conditions of the purchase contract. This product should not be mixed with other commercial wastes for disposal.

CE

DECLARATION OF CONFORMITY

We,

Lightware Kft. 15 Peterdy Street, Budapest H-1071, HUNGARY

as manufacturer declare, that the products

MX16x16DVI-Plus
MX12x12DVI-Plus
MX9x9DVI-Plus
(Computer Matrix Switcher)

in accordance with the EMC Directive 2004/108/EC and the Low Voltage Directive 2006/95/EEC is in conformity with the following standards:

EMI/EMC ..... EN 55103-1 E3, EN 55103-2

Safety.....EN 60065 Class I

Date: 28 September 2012

Name: Gergely Vida (Managing Director)

Signed: 

Table of contents

1. Introduction

Dear Customer,

Thank you for choosing Lightware routers. The standalone DVI-Plus matrices are single link DVI matrix switchers with various DVI inputs and DVI outputs respectively, which routes any input(s) to any combination of output(s).

The routers conform to DVI and HDMI specification without HDCP encryption, and switch signals between 25 - 225 MHz pixel clock frequency: from 640x480@60Hz to 1920x1200@60Hz or 2048x1080@60Hz resolutions.

The input signals are compensated for 12dB loss and outputs are preemphasized by +6dB, this way cable lengths up to 20 meters (65 feet) can be used.

The switcher has an RS-232 (or RS-422 optional) and an RJ45 LAN port for remote control applications and a control panel for local control operation. Front panel buttons are illuminated and reconfigurable with text for informative system integration.

2. General description

2.1. Box contents

- Routing switcher
- User's manual (this document)
- IEC power cable
- CD-ROM with control software
- RS-232 9 pole D-sub Male to Female straight serial cable
- UTP crosslink cable

2.2. Features

- **Advanced EDID Management –** The user can emulate any EDID on the switcher's inputs independently, read out and store any attached monitor's EDID in 100 internal memory locations, upload and download EDID files using Matrix Control Software.
- **Non-blocking cross point matrix architecture –** The router allows any input to be switched to any output or more outputs simultaneously.
- **2.25 Gb/s channel transmission –** Routes any DVI single link and HDMI signal between 25 and 225 MHz pixel clock frequency conforming to DVI and HDMI standards.
- **Supports all HDTV resolutions –** 720p, 1080i, 1080p 2K etc. HDTV signals without HDCP encryption up to 225 MHz pixel clock frequency regardless of the actual resolution passed through the router.
- **Supports HDMI signals –** non HDCP encrypted HDMI signals (with embedded audio) are handled properly.
- **Cable equalization –** DVI cables up to 20 meters can be used on all inputs thanks to the +12dB compensation.
- **Output boost –** DVI cables up to 15 meters can be used on all outputs thanks to the +6dB preemphasizing circuit.
- **Control by front panel buttons –** 16 or 12 or 9 source select, 16 or 12 or 9 destination select, Take/Auto, Load Preset, Save Preset, Control Lock, Output Lock.

- **Reconfigurable buttons –** Each button has a removable flat cap and a translucent label that can be inserted under the cap to identify sources and destinations.
- **RS-232 or RS-422 control –** Simple ASCII based protocol is used for switching, preset calling, status request, etc.
- **Ethernet control –** TCP/IP Ethernet 10Base-T or 100Base-TX (Auto- Sensing).
- **Built-in WEB site –** Easy access from a WEB browser to control and configure the switcher.
- **Universal power supply –** The built-in power supply accepts AC voltages from 100 to 240 Volts with 50 or 60 Hz line frequency on standard IEC-320 C14 connector.
- **Power failure memory –** In case of power failure, the unit stores its latest configuration, and after next power up it loads automatically.
- **Fiber cable support –** Self powered DVI fiber cables using +5V from DVI sources (graphic cards, etc.) usually consume more than 50 mA, which load is maximum allowed by DVI 1.0 standard. DVI-Plus series supports +5V 500 mA constant current output on each DVI output to power long distance fiber optical cables.
- **Zero frame delay –**Lightware's matrices add no frame noticeable delay to the switched signal. There is no frame or line period delays to the signals when passing a Lightware router.

2.3. Typical applications

Some typical connection variations with the matrix router are shown on Figure 2-1.

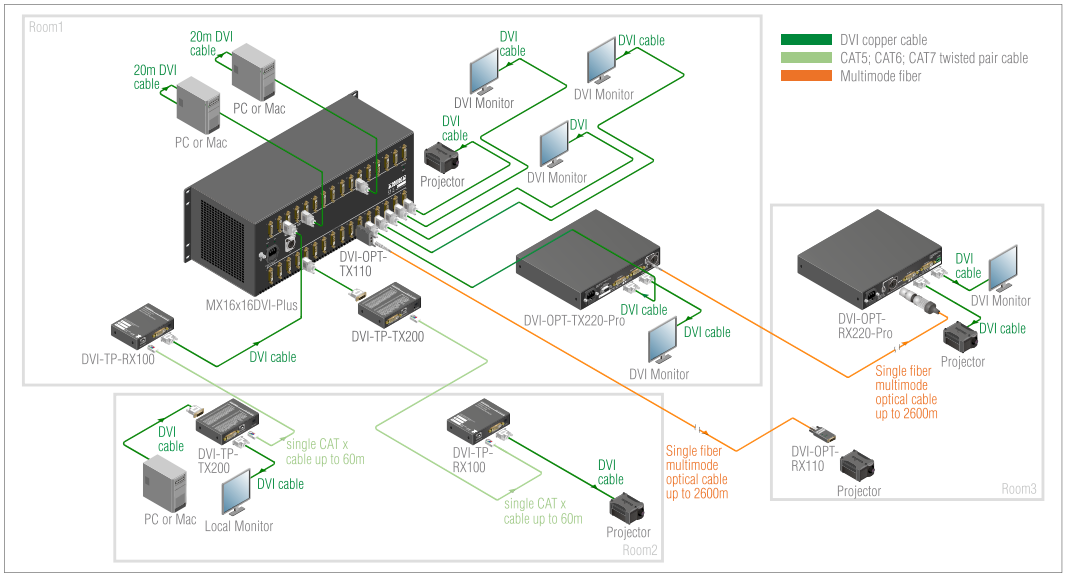


Figure 2-1. Typical application for MX16x16DVI-Plus

Application examples

- Small classrooms
- Multiroom video control
- Avionics
- Military
- Conference rooms

2.4. Understanding EDID

2.4.1. Basics

EDID stands for Extended Display Identification Data. Simply put, EDID is the passport of display devices (monitors, TV sets, projectors). It contains information about the display's capabilities, such as supported resolutions, refresh rates (these are called Detailed Timings), the type and manufacturer of the display device, etc.

After connecting a DVI source to a DVI display, the source reads out the EDID to determine the resolution and refresh rate of the image to be transmitted.

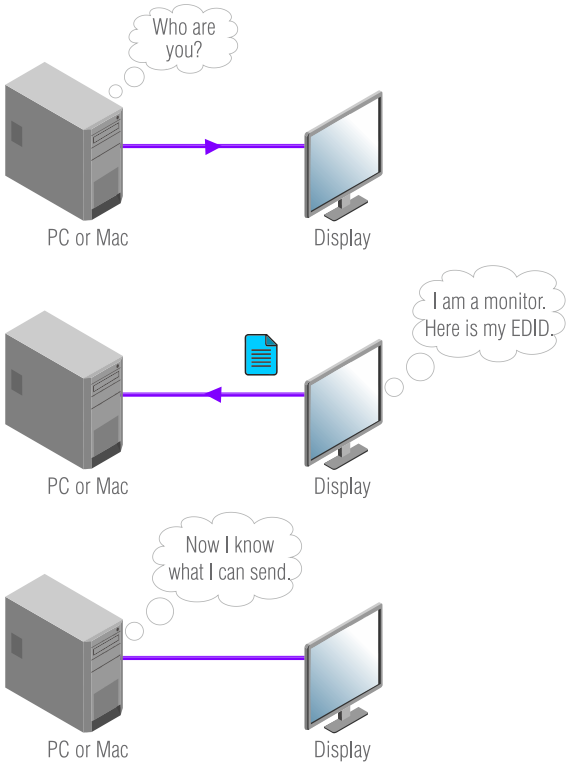


Figure 2-2. EDID communication

Most DVI computer displays have 128-byte long EDID structure. However, Digital Televisions and HDMI capable displays may have another 128 bytes, which is called E-EDID and defined by CEA (Consumer Electronics Association). This extension contains information about additional Detailed Timings, audio capabilities, speaker allocation and HDMI capabilities. It is important to know, that all HDMI capable devices must have CEA extension, but not all devices are HDMI capable which have the extension.

2.4.2. Common problems related to EDID

Problem: „My system consists of the following: a computer, a Lightware MX16x16DVI-Plus matrix, a WUXGA (1920x1200) LCD monitor, and an SXGA (1280x1024) projector. I would like to see the same image on the monitors and the projector. What EDID should I chose on the monitor and the projector?"

Solution: If you want to see the image on both displays, you need to select the resolution of the smallest display (in this case SXGA), otherwise the smaller display may not show the higher resolution image.

Problem: „I have changed to a different EDID on an input port of the matrix to have a different resolution but nothing happens."

Solution: Some graphics cards and video sources read out the EDID only after power-up and later they don't sense that EDID has been changed. You need to restart your source to make it read out the EDID again.

Problem: „I have an MX16x16DVI-Plus and I'm using a Lightware factory preset EDID. I would like to be able to choose from different resolutions, but my source allows only one resolution."

Solution: Most Lightware factory preset EDIDs allow only one resolution, forcing the sources to output only that particular signal. You need to select a Universal EDID. It supports all common VESA resolutions. Additionally it also features audio support.

2.5. Advanced EDID Management

Each DVI sink (e.g. monitors, projectors, plasma displays, and switcher inputs) must support the EDID data structure. Source BIOS and operating systems are likely to query the sink using DDC2B protocol to determine what pixel formats and interface are supported. HDMI standard makes use of EDID data structure for the identification of the monitor type and capabilities. Most DVI sources (graphic cards, set top boxes, etc.) will output DVI signal after accepting the connected sink's EDID information. In case of EDID readout failure or missing EDID the source will not output DVI video signal. MX16x16DVI-Plus provides Lightware's Advanced EDID Management function that helps system integration. The built in EDID Router stores and emulates 100 EDID data plus all monitor's EDID that are connected to the output connectors. First 50 EDID are factory presets, while memories 51 to 100 are user programmable. The router stores the EDID of all attached monitors or projectors for each output in a non-volatile memory. This way the EDID from a monitor is available when the monitor is unplugged, or switched off.

Any EDID can be emulated on any input. An emulated EDID can be copied from the EDID router's memory (static EDID emulation), or from the last attached monitors memory (dynamic EDID emulation). For example, the router can be set up to emulate a device, which is connected to one of the outputs. In this case the EDID automatically changes, if the monitor is replaced with another display device (as long as it has a valid EDID).

EDID is independently programmable for all inputs without affecting each other. All input has its own EDID circuit. EDID Router can be controlled via serial port or Ethernet.

Info *The user is not required to disconnect the DVI cable to change an EDID as opposed to other manufacturer's products. EDID can be changed even if a source is connected to the input and it is powered ON.*

Info *When EDID has been changed, the router toggles the HOTPLUG signal for 2 seconds. Some sources do not observe this signal, so in this case the change is not recognized by the source. In such cases the source device must be restarted or powered OFF and ON again.*

3. Controls and connections

3.1. Front panel view

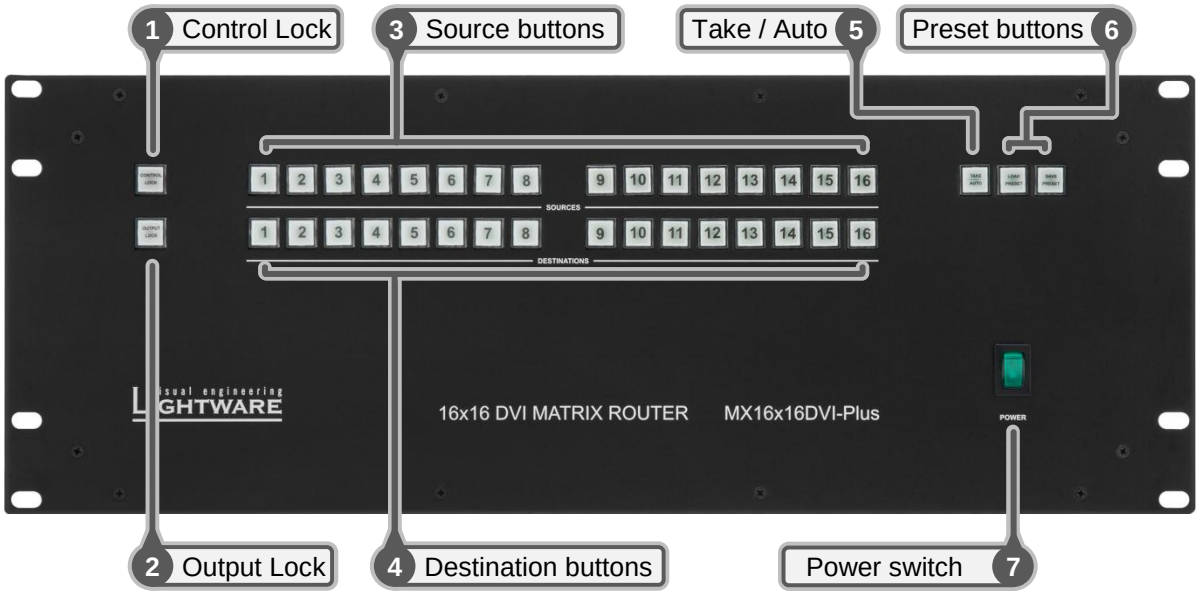


Figure 3-1. Front panel view

1	**Control Lock**	Disables or enables front panel operation. When red illuminated, all operations on front panel are prohibited. *See section 4.2.1 on page 17 for more information.*
2	**Output Lock**	Locks and protects one (or more) outputs. Inhibits accidental input changing on protected output. *See section 4.2.8 on page 21 for more information.*
3	**Source buttons**	Source buttons have three functions: to select an input, to select a preset and to view the selected input's state (only in TAKE mode). *See section 4.2 on page 17 for more information.*
4	**Destination buttons**	Destination buttons have two functions: to select an output, or to view the selected output's state. *See section 4.2 on page 17 for more information.*
5	**Take / Auto**	Displays the actual switching mode of the router (TAKE or AUTOTAKE). Long press toggles the switching mode, short press executes switching in TAKE mode. *See section 4.2.2 on page 17 for more information.*
6	**Load Preset**	Loads and executes a previously saved preset from one of the preset memories.
	Save Preset	Stores actual matrix state, in one of the preset memories. *See section 4.2.7 on page 20 for more information.*
7	**Power switch**	The matrix can be switched OFF/ON with this switch.

Info — *MX12x12DVI-Plus front panel differs only in that it has only 12 source and 12 destination buttons.*

Info — *MX9x9DVI-Plus front panel differs only in that it has only 9 source and 9 destination buttons.*

3.2. Rear view

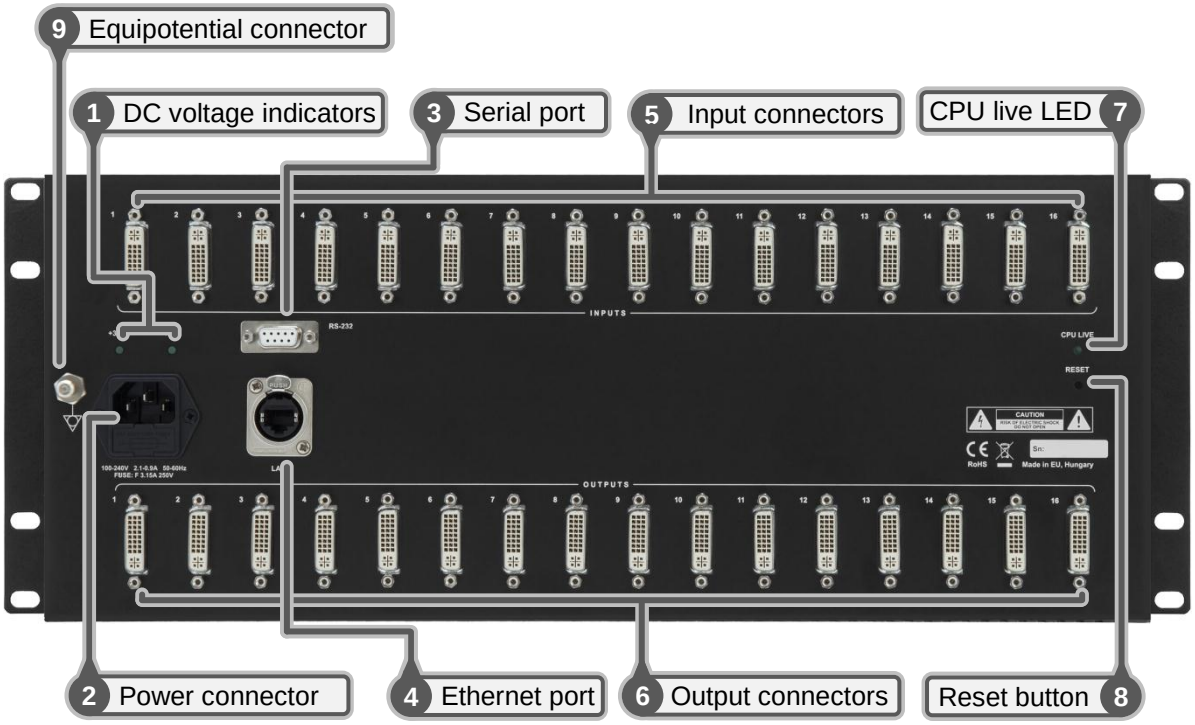


Figure 3-2. Rear view

1	**DC voltage indicators**	LED indicators for internal DC power voltages.
2	**Power connector**	Standard IEC-320 C14 power connector. The router works with 100 to 240 Volts, 50 or 60 Hz power sources. The fuse can be replaced with F3.15A type only!
3	**Serial port**	9 pole D-SUB female connector. Can be ordered with RS-232 or RS-422 control. *See section 3.3.3 on page 15 for more information.*
4	**Ethernet port**	Locking RJ45 connector. Remote control port for connecting the unit to Local Area Network (LAN). *See section 3.3.5 on page 16 for more information.*
5	**Input connectors**	29 pole DVI–I digital-only female receptacle connectors. Connect DVI source devices to these connectors. *See section 3.3.1 on page 14 for more information.*
6	**Output connectors**	29 pole DVI–I digital-only female receptacle connectors. Connect DVI sink devices to these connectors. *See section 3.3.2 on page 14 for more information.*
7	**CPU live LED**	Continuously blinking LED if the CPU works properly.
8	**Reset button**	Resets all internal hardware elements.
9	**Equipotential connector**	Plug connector for potential equalization. *See section 3.3.4 on page 15 for more information.*

Info *MX12x12DVI-Plus rear panel differs only in that it has only 12 input and 12 output connectors.*

Info *MX9x9DVI-Plus rear panel differs only in that it has only 9 input and 9 output connectors.*

3.3. Electrical connections

3.3.1. DVI inputs

Standalone DVI-Plus matrices provide 29 pole DVI-I connectors for inputs, however only digital pins are internally connected. This way, users can plug in any DVI connector, but keep in mind that analog signals (such as VGA or RGBHV) are NOT processed.

Always use high quality DVI cable for connecting sources and displays.

Fix +12 dB cable equalization is provided, this way DVI cables up to 20 meters can be used on all inputs.

Pin	Signal	Pin	Signal	Pin	Signal
1	TMDS Data2-	**9**	TMDS Data1-	**17**	TMDS Data0-
2	TMDS Data2+	**10**	TMDS Data1+	**18**	TMDS Data0+
3	TMDS Data2 Shield	**11**	TMDS Data1 Shield	**19**	TMDS Data0 Shield
4	*nc*	**12**	*nc*	**20**	*nc*
5	*nc*	**13**	*nc*	**21**	*nc*
6	DDC Clock	**14**	+5V Power	**22**	TMDS Clock Shield
7	DDC Data	**15**	GND (for +5V)	**23**	TMDS Clock+
8	nc	**16**	Hot Plug Detect	**24**	TMDS Clock-
C1	nc	**C2**	nc	**C3**	nc
C4	nc	**C5**	GND		

Table 3-1. DVI-I digital only connector Single Link pin assignments

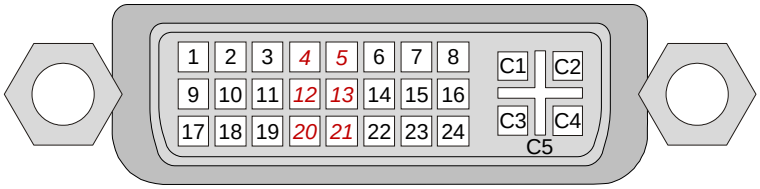


Figure 3-3. DVI connector

3.3.2. DVI outputs

Standalone DVI-Plus matrices provide 29 pole DVI-I connectors for outputs, however only digital pins are internally connected. This way, users can plug in any DVI connector, but keep in mind that analog signals (such as VGA or RGBHV) are NOT processed.

Thanks to the fix +6 dB pre-emphasizing circuit, DVI cables up to 15 meters can be used. For using longer cable runs at outputs, use fiber optical DVI transmitters (like Lightware DVI-OPT-TX110) or active DVI repeaters/extenders.

No output reclocking is provided.

Fiber Cable powering

As special feature standalone DVI-Plus matrices are able to supply 500 mA current on DDC +5V output (pin 14 on output connectors) to power fiber optical DVI cables. Standard DVI outputs or graphic cards supply only 55 mA current on +5V output, thus unable to power directly a fiber optical cable.

Info *The matrix switcher does not check if the connected sink (monitor, projector or other equipment) supports Hotplug or EDID signals but outputs the selected signal immediately after switch command.*

3.3.3. RS-232 / RS-422 control port

Lightware standalone DVI-Plus matrices can be remote controlled through industry standard 9 pole D-SUB female connector located on the rear panel of the unit. The router can be ordered with RS-232 or RS-422 control port

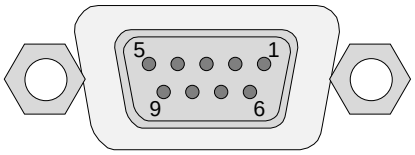
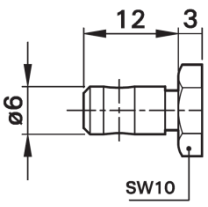


Figure 3-4. D-SUB 9 pole female connector (DE9F)

Pin nr.	RS-232	RS-422
1	NC - non connected	TX- data transmit complement
2	**TX data transmit (output)**	TX+ data transmit true
3	**RX data receive (input)**	RX+ data receive true
4	DTR (internally connected to Pin 6)	RX- data receive complement
5	**GND signal ground (shield)**	GND signal ground (shield)
6	DSR (internally connected to Pin 4)	NC - non connected
7	RTS (internally connected to Pin 8)	NC - non connected
8	CTS (internally connected to Pin 7)	NC - non connected
9	NC - non connected	NC - non connected

Table 3-2. D-SUB 9 pole pin assignments

3.3.4. Equipotential connector



The purpose of additional potential equalization is to equalize potentials between different metal parts that can be touched simultaneously, or to reduce differences of potential which can occur during operation between the bodies of medical electrical devices and conductive parts of other objects.

Ø6 mm plug made of nickel-plated brass can be found on the left side of the unit's back for potential equalization.

3.3.5. Ethernet port

Lightware standalone DVI-Plus matrices can be remote controlled through Ethernet as well. The Ethernet port can be connected to a LAN hub, switch or router with a UTP patch cable. If connecting to a computer directly, a cross UTP cable has to be used!

The robust Neutrik EtherCON connector ensures reliable connection, however normal RJ45 connectors can be used as well.

See section 4.3 about remote operation on page 23 for more information.

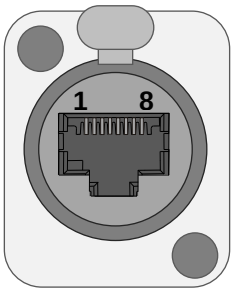


Figure 3-5. RJ45 connector

Figure 3-6. RJ45 plug

Lightware recommends the termination of TP cables on the basis of TIA/EIA T 568 A or TIA/EIA T 568 B standards.

Pin	Name	TIA/EIA T568 A	color and name	TIA/EIA T568 B	color and name
1	TX +		white/green stripe		white/orange stripe
2	TX -		green solid		orange solid
3	RX +		white/orange stripe		white/green stripe
4	Not used		blue solid		blue solid
5	Not used		white/blue stripe		white/blue stripe
6	RX -		orange solid		green solid
7	Not used		white/brown stripe		white/brown stripe
8	Not used		brown solid		brown solid

Table 3-3. Recommended termination of TP cables

4. Operation

4.1. Power

Connect the power cord to the router's standard IEC-320 C14 AC power input connector. The unit can be switched ON/OFF with the front panel rocker switch. When it is on, the switch illuminates, and the fan operates.

After powered on, the unit performs a self-test, and then all front panel buttons light up for one second. After the self-test the CPU live LED starts blinking, the router reloads its last configuration and it is ready to use.

Info: *After switching ON, the router reloads the latest settings that were used before it was turned off. The router has an internal emergency memory that stores all current settings and tie configurations. This memory is independent from presets and invisible for the user. This built-in feature helps the system to be ready immediately in case of power failure or accidental power down.*

4.2. Front panel operations

4.2.1. CONTROL LOCK

Front panel button operations can be enabled or disabled using CONTROL LOCK button, while RS-232 / RS-422 and Ethernet control is still enabled. If the button is not illuminated, front panel button operations are enabled. If it illuminates red continuously, front panel operations are inhibited.

Press and release the CONTROL LOCK button to toggle the control lock state.

4.2.2. TAKE / AUTOTAKE modes

The router has two different switching modes: TAKE and AUTOTAKE. If the TAKE / AUTO button is unlit, TAKE mode is active. When the TAKE / AUTO button continuously lights green, AUTOTAKE mode is selected.

Press and hold the TAKE / AUTO button for three seconds to toggle between TAKE and AUTOTAKE modes.

TAKE mode allows the user to connect or disconnect multiple outputs to an input at once. This mode is useful when time delay is not allowed between multiple switching. The commands are only realized when the TAKE button is pressed. If no button is pressed for two seconds, all preselected actions (which were not realized with the pressing TAKE) will be ignored, and the router returns to its idle state.

AUTOTAKE mode is useful when immediate actions must be done or fast switching is needed between sources on a particular destination. In this mode switching occurs immediately upon pressing one of the input selector buttons.

4.2.3. SOURCES and DESTINATIONS buttons

Input and output ports have dedicated buttons on the front panel. These buttons are labeled with numbers and have backlight to indicate active or selected ports. These are referred as SOURCES and DESTINATIONS buttons.

4.2.4. Viewing crosspoint state

User can check the current switching status on the front panel using front panel buttons. This status view feature is slightly different in TAKE or AUTOTAKE modes because of different switching philosophy of the two modes.

Info *Status view occurs whenever the router has to be switched. After entering the view state, the user can change the routing configuration. Viewing and switching can be done after each other, or if nothing is pressed for three seconds, the router returns to idle state.*

View current state in TAKE mode

If all source and destination buttons and TAKE button are unlit (the unit is in TAKE mode, and no input was selected in last 3 seconds), user can verify both input and output connections. This informative display will remain for 3 seconds, and then all button lamps go out. In TAKE mode no accidental change can be done unless TAKE button is pressed.

For viewing **input connections**, press and release a source button. Now the selected source button and all destination buttons will light up which are currently connected to the selected source.

For viewing **output connections**, press and release a destination button. Now the source button which is connected to the selected destination will light up. If no source button is lighting, the selected destination is in muted state.

View current state in AUTOTAKE mode

In AUTOTAKE mode only states of destinations can be viewed.

Press and release the required destination button. Now the source button which is connected to the selected destination will light up. If no source button is lighting, the selected destination is in muted state. By pressing another destination button, the state of that destination can be seen.

Info *Be careful, as in AUTOTAKE mode if a source button is pressed, it is immediately connected to the last selected destination.*

4.2.5. Switching

Creating a connection or multiple connections in TAKE mode

Step 1. First press and release the selected source button. The pressed source button and all destination buttons which are currently connected to this source will light up. The dark remaining destination buttons are not connected to this source. This is an informative display about current status of the selected input (view only).

Step 2. Press and release the selected destination button or buttons which has to be connected to the selected source. The preselected destination button(s) start(s) blinking.

Step 3. Press and release TAKE button to execute the tie or ties. Now the selected input is switched to the selected output or to the multiple outputs.

Info: *If the pressed destination is locked then it could not be selected. This is indicated by a short flash of the OUTPUT LOCK when a locked destination is pressed.*

Disconnecting or muting in TAKE mode

Step 1. First press and release the selected source button. The pressed source button and all destination buttons which are currently connected to this source will light up. The dark remaining destination buttons are not connected to this source. This is an informative display about current status of the selected input (view only).

Step 2. Press and release the selected, green lighting destination button which has to be disconnected from the selected source. The pressed destination or multiple destinations will turn dark.

Step 3. Press and release TAKE button to execute disconnection.

Info *Deselected destinations are disconnected from any source, thus output devices will display black image or "no signal" message, or automatically will turn off.*

Info: *If the pressed destination is locked then it could not be deselected. This is indicated by a short flash of the OUTPUT LOCK when a locked destination is pressed.*

Info *Multiple switching and deselecting actions can be done simultaneously, during only one TAKE action.*

Creating a connection in AUTOTAKE mode

Step 1. Press and release the selected destination button. The pressed destination button, and the actually connected source button light up green. If no source is connected (the output is muted) no source button will light up.

Step 2. Press and release the selected input button. The switch action will be executed immediately. Switching between sources to the selected destination can be done directly.

Info: *If the pressed destination is locked then sources could not be selected. This is indicated by a continuously light of the OUTPUT LOCK when a locked destination is pressed.*

Deselecting or muting in AUTOTAKE mode

Step 1. Press and release the selected destination button. The pressed destination button, and the actually connected source button are lighting green. If no source is connected (the output is muted) no source button will light up.

Step 2. Press and release the active green lighting source button. The output is muted.

Info *Deselected destinations are disconnected from any source, thus output devices will display black or blue image or "no signal" message and may automatically turn off.*

Info: *If the pressed destination is locked then sources could not be deselected. This is indicated by a continuously light of the OUTPUT LOCK when a locked destination is pressed.*

4.2.6. Switching operations flowchart

To better understand the viewing and switching sequence in TAKE and AUTOTAKE modes, please study the below diagrams.

TAKE mode

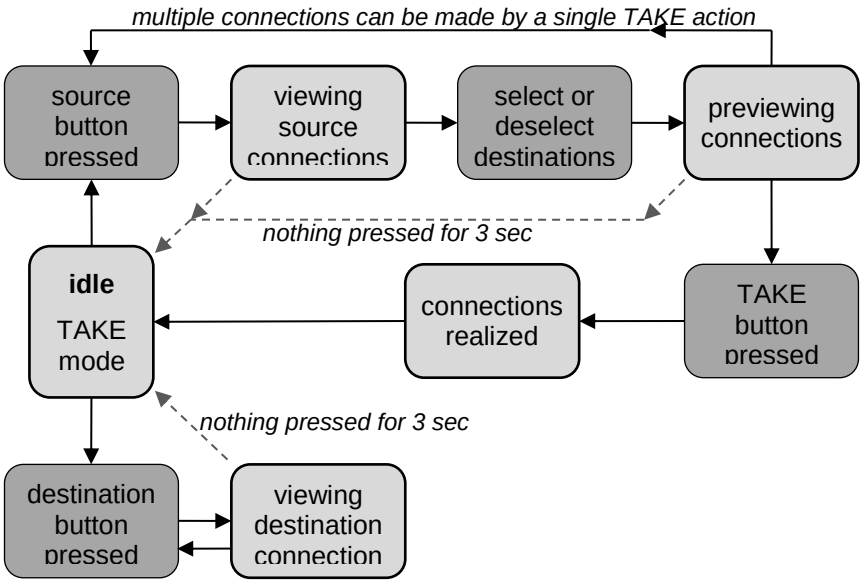


Figure 4-1. Switching flowchart in TAKE mode

AUTOTAKE mode

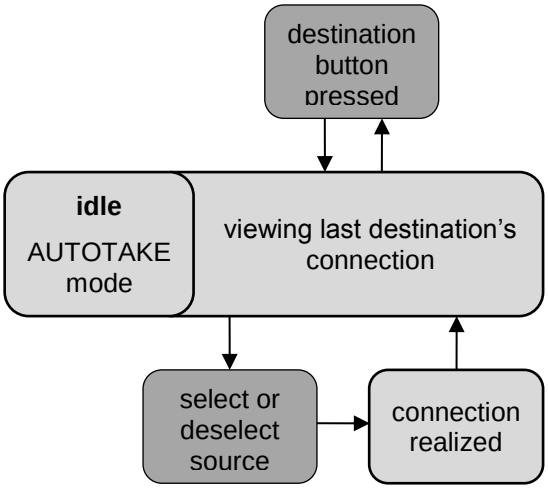


Figure 4-2. Switching flowchart in AUTOTAKE mode

4.2.7. Preset operations

All Lightware matrices have 32 user programmable presets. Each preset stores a configuration regarding all input connections and mute state for all outputs. All presets are stored in a non-volatile memory; the router keeps presets even in case of power down. Memory numbers are assigned to source buttons. The higher numbered presets are accessible only through software control.

Saving a Preset in TAKE mode

Step 1. Create the desired connections which have to be saved.

Step 2. Press and release the SAVE PRESET button.

Step 3. Press and release a source button according to the desired memory address (source 1 to 16 or 12 or 9).

Step 4. Press and release TAKE button. Now the current configuration is stored in the selected memory.

Info *Preset save action always stores the current configuration for all outputs including mute state, but ignoring lock state.*

Loading a Preset in TAKE mode

Step 1. Press and release LOAD PRESET button.

Step 2. Press and release a source button according to the desired memory address (source 1 to 16 or 12 or 9).

Step 3. Press and release TAKE button. Now the selected preset is loaded.

Info *Loading a preset modifies all output states that are not currently locked.*

Saving a Preset in AUTOTAKE mode

Step 1. Create the desired connections which have to be saved.

Step 2. Press and release SAVE PRESET button.

Step 3. Press and release a source button according to the desired memory address (source 1 to 16 or 12 or 9). Now the current configuration is stored in the selected memory.

Info *Preset save action always stores the current configuration for all outputs including mute state, but ignoring lock state.*

Loading a Preset in AUTOTAKE mode

Step 1. Press and release LOAD PRESET button.

Step 2. Press and release a source button according to the desired memory address (source 1 to 16 or 12 or 9). Now the selected preset is loaded.

Info *Loading a preset modifies all output states that are not currently locked.*

4.2.8. OUTPUT LOCK

Using Lightware routers it is possible to lock a destination's state. This feature prevents an accidental switching to the locked destination in case of important signal. Locking a destination means, that no input selection or muting can be executed on that particular destination.

Destinations can be independently locked or unlocked. Locking a destination does not affect other destinations.

View locked outputs in TAKE mode

Step 1. Press and release the Output Lock button.

Step 2. The Output Lock button starts to blink and all the buttons of any locked destinations light up, and remain illuminated for three seconds.

Lock an output in TAKE mode

Step 1. Press and release the Output Lock button.

Step 2. Now the Output Lock button starts to blink and all the locked output's buttons illuminate green (view state).

Step 3. If no button is pressed for three seconds, the router returns to idle state.

Step 4. If an unlit output button is pressed, it starts to blink, to indicate that it is preselected for output locking.

Step 5. Press and release TAKE button. The selected destinations are now locked.

Unlock an output in TAKE mode

Step 1. Press and release the Output Lock button.

Step 2. Now the Output Lock button starts to blink and all the locked output's buttons illuminate green (view state).

Step 3. If no button is pressed for three seconds, the router returns to idle state.

Step 4. If an illuminating output button is pressed, it goes off, to indicate that it is preselected for unlocking.

Step 5. Press and release the TAKE button. The deselected destinations are now unlocked.

View locked outputs in AUTOTAKE mode

In AUTOTAKE mode a destination is selected all the time. Therefore the currently selected output and input buttons are illuminated. The Output Lock button illuminates regarding to the lock state of the current output.

Viewing all locked outputs is not possible in AUTOTAKE mode, as pressing the Output Lock button instantly locks or unlocks the current output.

Lock an output in AUTOTAKE mode

Step 1. Press and release the required destination button. Now the selected destination button and the currently configured source button light up (view mode).

Step 2. Press and release the Output Lock button. Now the Output Lock button lights up in red, and lock function is activated at once. No source can be changed at the locked destination.

Unlock an output in AUTOTAKE mode

Step 1. Press and release the required destination button which was previously locked. Now the selected destination button and the currently configured source button and the Output Lock button light up.

Step 2. Press and release the Output Lock button (deselect). Now the Output Lock button turns off, and the locking function has been cancelled.

4.3. Remote operation

Lightware matrix routers can be controlled through various interfaces remotely. This makes possible to use such functions that are not accessible via the front panel. Also, this helps system integrators and operators to control multiple devices in a big system through a single user interface.

4.3.1. Control interfaces

Users can connect to the matrix through

- Ethernet (TCP/IP),
- Serial port (RS-232 or RS-422)

The available remote connections and the relating chapters are listed below.

User interface	Connection type		further information
	Ethernet port	Serial port	
Lightware matrix controller software	✓	✓	chapter 5 page 26
Built-in website	✓	no	chapter 6 Page 39
third party control system	✓	✓	chapter 8 Page 50

Table 4-1. Available remote connections

Info *Ethernet port can be connected to a LAN hub, switch or router with a UTP patch cable. If connecting to a computer directly, a crosslink UTP cable has to be used!*

4.3.2. User interface comparison

The built-in website and the Lightware matrix controller software have little different capabilities. The table below summarizes the main differences, helping you to select the interface that suits your needs.

Function	Matrix controller software	Built-in website
platform	Windows only	ANY ✓
installation	installation required	web browser needed only ✓
I/O and preset names	✓	no
Preview presets	✓	no
Easy EDID creator	✓	no
EDID editor	✓	no
EDID upload / download	✓	no

Table 4-2. User interface comparison

4.3.3. Multiple simultaneous connections

The matrix allows simultaneous remote control over multiple interfaces. Web control, Lightware Matrix Controller Software over Ethernet and Lightware Matrix Controller Software with serial connections can be used at the same time.

4.3.4. Serial port settings

Standalone DVI-Plus matrices can be ordered with either RS-232 or RS-422 communication port. The port settings are done in the factory. D-SUB connector pin assignments can be found in chapter *3.3.3* on page *15*.

The device uses standard RS-232 or RS-422 interface with the following settings:

9600 Baud

8 data bit

1 stop bit

no parity

straight serial cable

4.3.5. IP settings

The Ethernet port can be configured remotely through Lightware Matrix Controller Software or the built-in website.

The factory default IP settings or DHCP mode can be activated quickly through front panel shortcut buttons. To reset the IP configuration perform the following:

Resetting the IP address

Reset to factory default IP configuration or to DHCP mode with front panel buttons.

Step 1. Switch the router to TAKE mode if used previously in AUTOTAKE mode by pressing TAKE button for 3 seconds (light will go off).

Step 2. Press and release Control Lock button (it lights in up red continuously).

Step 3. Press and keep pressed the Output Lock button (the current protocol indication will light up).

Step 4. Press and release the

a) **Load Preset** button to set the **factory default IP** settings

IP address:	192.168.254.254
port number:	10001
subnet mask:	255.255.0.0
gateway:	0.0.0.0

b) **Save Preset** button to set **DHCP enabled**

IP address:	Acquired with DHCP
port number:	unchanged
subnet mask:	Get from DHCP server
gateway:	Get from DHCP server

Step 5. A light sequence will occur to confirm the command. (Take/Auto, Load Preset and Save Preset buttons will light up one after the other)

Step 6. Reinsert the LAN cable to the Ethernet port if it was unplugged.

Step 7. Wait about 20 seconds before connecting the router via Ethernet.

4.3.6. Control protocols

Matrix routers can be controlled with multiple control protocols. Lightware routers have a special protocol, but to interoperate with third party devices, a secondary protocol is also provided.

Info: *Lightware Matrix Controller software and the built-in website works only with LW protocol (#1)!*

The currently used protocol can be viewed or changed any time on the matrix front panel or with protocol commands.

Change (view) protocol on the front panel

Step 1. Switch the router to TAKE mode if used previously in AUTOTAKE mode by pressing TAKE button for 4 seconds. (light will go off)

Step 2. Press and release Control Lock button (it lights in up red continuously)

Step 3. Press and keep pressed the Output Lock button. Now the active protocol is displayed: (view protocol) One source button lights up according to the current protocol:

- Source#1 lights: Lightware protocol is active
- Source#2 lights: Protocol#2 is active

Step 4.

a) If you do not want to change the protocol, release the Output Lock button (view only).

b) If you want to change the protocol keep the Output Lock button pressed, and press the desired Source button.

Change (view) protocol via remote connection

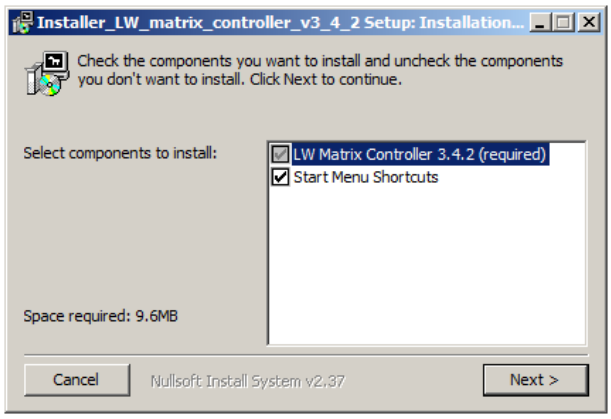
Connect to the matrix through any control interface, then use the commands described in the Lightware protocol section *8.6.7* and *8.6.8* on page *61*.

5. Software control – Using Lightware Matrix Controller

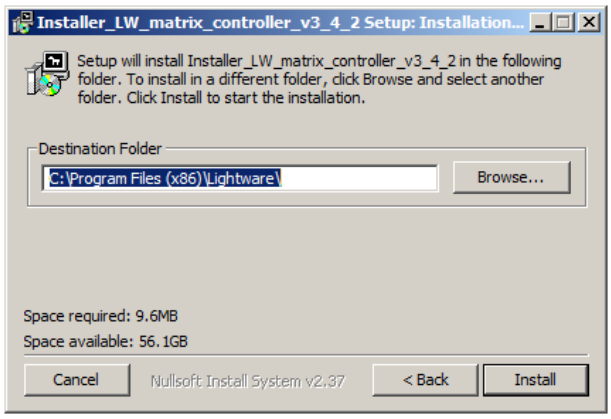
The matrix router unit can be controlled using Lightware Matrix Controller Software from a Windows PC or Laptop through RS-232 or Ethernet port.

5.1. Installing the Matrix Controller software

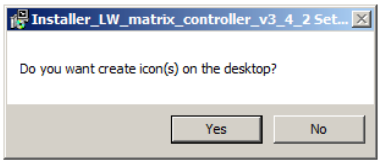
Step 1. Run Installer_LW_matrix_controller_v3_4_2.exe



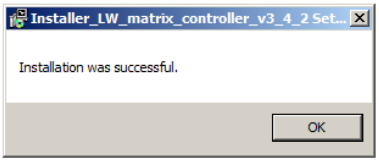
Step 2. Select destination folder and click Install (Using the default path is highly recommended)



Step 3. If you want to create desktop icon click Yes in the next pop-up window:



Step 4. After finishing the installation the following message appears:



Step 5. To run Lightware matrix control software find the shortcut icon in Start menu → Programs → Lightware → LW_matrix_controller_v3.4.2 or on the desktop, and double click.

Uninstalling

To uninstall the control software double click on: Start menu → Programs → Lightware → LW_matrix_controller_v3_4_2 → Uninstall

5.2. Establishing the connection

The unit can be controlled from a Windows computer using Lightware Matrix Controller software through RS-232 connection or Ethernet port.

Step 1. Connect the matrix switcher and the computer either via

- Serial port, with RS-232 Male to Female cable (straight through)
- Ethernet, with LAN patch cable (to a Hub, Switch or Router)
- Ethernet, with LAN cross cable (directly to Computer)

Info *If the connection is made through the router's Ethernet port, be sure that the computer is in the same network as the router.*

Info *If the computer has multiple Ethernet connections (for example WiFi and LAN connections are used simultaneously) you will have to know the IP address for the one that is used for controlling the matrix.*

Step 2. Start the application

To run the CONTROL SOFTWARE double click on the icon of the software on the desktop or select proper shortcut from Start Menu → Programs → Lightware folder.

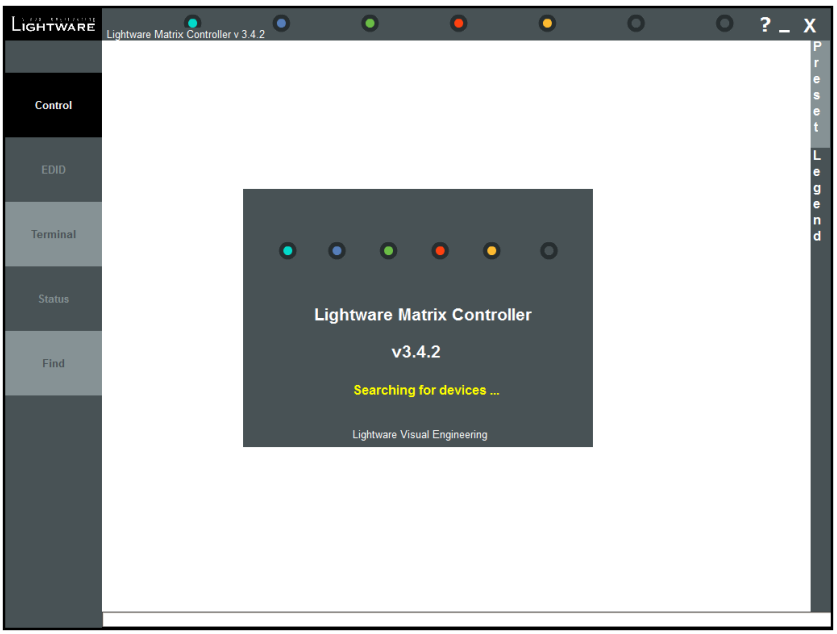


Figure 5-1. Matrix Controller software startup

Step 3. The Find dialog appears automatically

If the connection has been made via **Ethernet**, the software picks the primary Ethernet interface, and shows the available Lightware devices on that port. The device type and the serial number are displayed automatically. Click the desired device, to highlight it.

If the computer has more Ethernet ports (for example WiFi and LAN connections are used simultaneously), you must select the one that is used to control the router from the drop-down list. If you are unsure which one to use, try to search for devices on all of them.

If the connection has been made via **serial port**, the device type and serial number can be inquired by double clicking the appropriate port, or it can be highlighted with a single click.

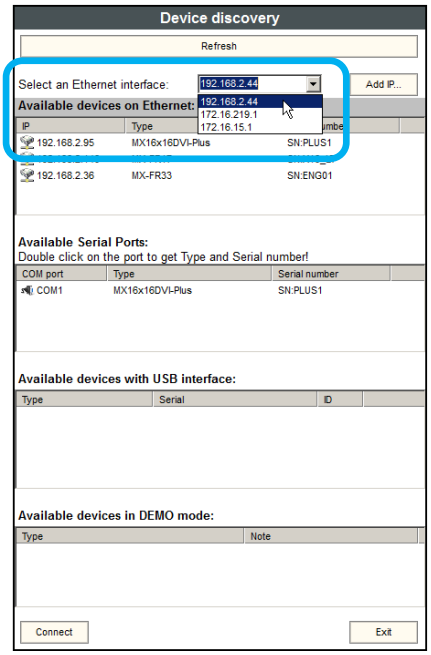


Figure 5-2.
Ethernet connection

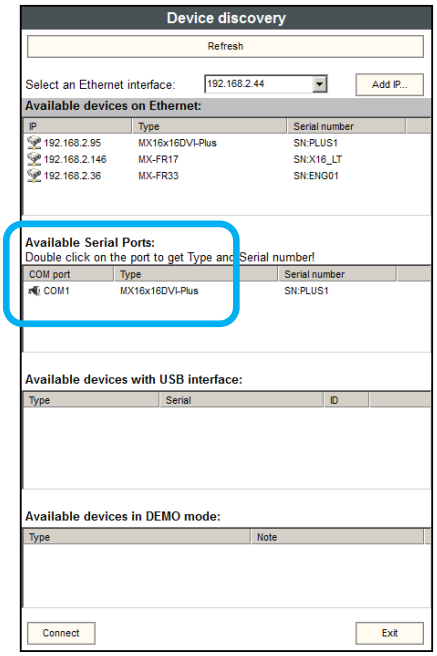


Figure 5-3.
Serial connection

Step 4. Click on the Connect button to connect to the device

Info: *If the router is not listed in the "available devices on Ethernet" box, try searching again, or see the trouble shooting guide in section 11.3 about TCP/IP connection problems on page 79.*

Info: *Be sure that the firewall is not blocking the application!*

Info: *Only one user is allowed to connect to the matrix switcher via Ethernet.*

When the Lightware Matrix Controller finds the hardware, it determines the product type, and the control menu appears. The current state of the crosspoint switch is displayed.

Figure 5-4. Matrix Controller crosspoint array

5.3. Control menu

This menu contains the crosspoint area and the preset area. After connecting to a new device, this menu appears by default.

This view adapts to the input and output numbers of the router. I1, I2, I3 … columns represent the inputs, the O1, O2, O3 … rows represent the outputs. Each green square represents an active connection. Since an input can be routed to more outputs simultaneously, there can be one or more green squares in one column. However an output can be switched to only one input, so there can be only one green square in any row.

5.3.1. Input and output card types

With Lightware Hybrid Technology the matrix frames can be equipped with different types of cards. The colored bars near the crosspoint area display the type of the card in each slot. Whether it is an optical, a twisted pair or other kind of card, a different color represents it's type.

Info *Since this product model is a compact built system, the cards cannot be changed.*

Legend for card types:

MX-DVI-D card

5.3.2. Port status display

To help identifying connected sources and sinks, the background of input and output port labels are colored depending on port status.

If the mouse pointer hovers over an input our output port label, a hint message will come up showing the port's name and its status information.

Legend for input ports	Legend for output ports
No source connected; or no information available	No sink connected; or no information available
+5V is present from the source; (source connected*)	Hotplug is present

Info *The matrix can sense only the connecting of input and output devices. There is no information about the signal type or the valid video stream.*

5.3.3. Input and output names

To help memorizing the connected sources and destinations, names can be assigned to inputs and outputs. I/O names can be maximum 16 characters long, and can contain any ASCII characters except: ( ) { }. All characters are converted to uppercase.

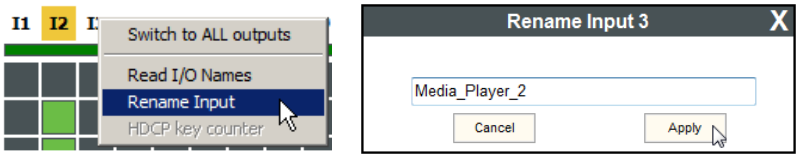
Info: *The I/O names are stored in the router's memory so they can be read by any other computer.*

Rename I/O port

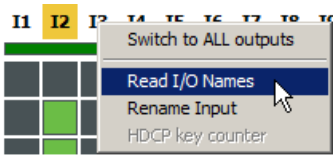
Step 1. Right click on the desired input or output.

Step 2. Click Rename Input (or Output) in the popup menu. The Rename window appears.

Step 3. Type the desired name, and click Apply.



Read I/O names



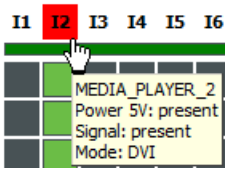
I/O names are loaded automatically when connection to the router is established. However I/O names can be re-read manually as well.

Step 1. Right click on any input or output.

Step 2. In the popup menu click Read I/O names.

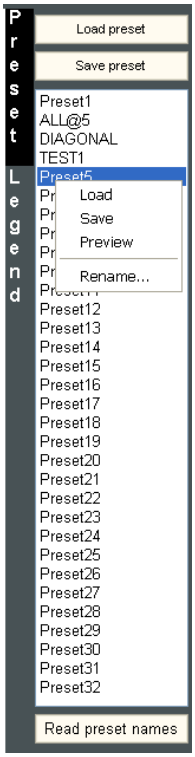
The result can be red in the terminal window or in the quick I/O port information.

5.3.4. Quick I/O port information



If the mouse pointer is moved above an I/O port label, a tooltip comes up showing the main information about the port status. The port name, the incoming signal and connection status can be checked. Output status shows only port name and connections.

5.3.5. Switch, mute and lock



For making a connection click on the desired square. If the output port is not locked, the connection will be made. If the output port is muted, the connection will be made, but matrix will not give video signal on the output. For switching an input to all outputs, click with the right mouse button on the input label, and click “Switch to all outputs” in the popup menu.

Outputs can be easily muted by clicking on the button titled ’M’ beside the output. This means that no signal is present at this output. If mute is active, the color of the button’s background changes to black.

Outputs can be locked to any input. After locking an input to an output, no switching is permitted to this output unless it is unlocked again. If output lock is active, the color of the button’s background changes to red.

Info: *Loading a preset doesn’t alter either the lock state or the switch state of a locked output. If an output is locked to an input before preset loading it will also be locked to that input after preset loading, so locked outputs ignore the preset.*

5.3.6. Preset operations

Preset operations can be done on the PRESET panel. The panel can be accessed by clicking on the vertical ‘Preset’ label at the right margin of the software window. Each Lightware matrix switcher has 32 preset memories that can be loaded and saved at any time.

Info: *A preset setting stores a full configuration of all outputs, so preset loading have an effect on every output, except the locked ones.*

Load preset

Step 1. Open the Preset panel on the right of the software window.

Step 2. Select the preset memory (Preset1...Preset32) you want to load as the next crosspoint configuration.

Step 3. Press LOAD PRESET button or right click on the desired preset, and click Load in the popup menu. Now the preset is loaded.

Step 4. The new I/O configuration is displayed on the matrix switching area.

Save preset

Step 1. Make the desired crosspoint connections on the matrix switching area.

Step 2. Select the preset memory (Preset1...Preset32) where you want to save your current crosspoint connections.

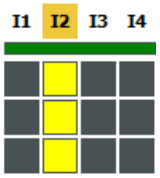
Step 3. Press SAVE PRESET button or right click on the preset and click Save in the popup menu.

Step 4. A confirmation message comes up. Click YES to save the current crosspoint connections to the selected preset memory. The preset is stored.

Preview preset

Step 1. Right click on the desired preset, and click Preview in the popup menu.

Step 2. The preset's I/O configuration is displayed on the matrix switching area with yellow squares for two seconds.



5.3.7. Preset names

To help memorizing the preset configurations, names can be assigned to saved presets. Preset names can be maximum 16 characters long, and can contain any ASCII characters except: ( ) { }. All characters are converted to uppercase.

Rename preset

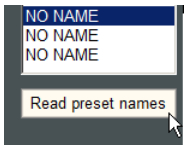
Step 1. Select the preset memory (Preset1...Preset32) you want to rename.

Step 2. Click RENAME... in the popup menu. The Rename window appears.

Step 3. Type in the desired name and click APPLY. Now the new preset name is stored.

Read preset names

The control software downloads the names automatically upon establishing connection to the matrix. Preset names can be re-read manually by clicking on the READ PRESET NAMES button in the preset area.



Info: *The preset names are stored in the router's memory so they can be read by another computer.*

5.3.1. Output parameter settings

By right clicking on an output label a dialog window appears showing the parameters for the corresponding output. Some settings are only accessible with Lightware PRO series routers.

Scope of changes

There are two options to apply changes. To set the scope of the changed settings, select the desired option in the top left box.

Apply changes to current output: this option means the modified parameters are applied only to the currently selected port.

Apply changes to all outputs: this option means that the modified parameters are applied to all output ports.

Info: *When opening this window again, the scope selection will be set to "Current Output" regardless of the active selection at the time of closing. It is to avoid making changes to all outputs by mistake.*

Reload factory defaults

Current output: Reloads the default values to the currently selected output.

All outputs: Loads the factory default values to all outputs.

5.4. EDID menu

Advanced EDID Management can be accessed by clicking on the EDID menu. This view is divided in two segments. The upper segment can be opened by clicking the green arrow. This segment contains the EDID editor. The lower segment is the EDID router area. This consists of two list windows, which can display a selected part of the EDID memory.

Info *When the user enters the menu for the first time, the software starts to download the whole EDID list from the matrix. It may take about 30-40 seconds.*

5.4.1. EDID Router operation

After the list is downloaded, the current status is shown. The EDID memory consists of four parts. Any memory part can be displayed on either side by using the drop down lists.

The **Emulated EDID List** shows the currently emulated EDIDs for each input. It contains the resolution, manufacturer and vendor name of the EDID reported to the sources for each input separately. The source column displays the memory location that the current EDID was routed from (Mem0 is shown as source if the source was changed after it was copied to an input). The rows with red background are dynamically routed to the input.

The **Last attached Monitor's EDID List** contains the resolution, manufacturer and vendor name of the display devices connected to matrix switcher's output. The matrix remembers the last display device's EDID, so there is an EDID shown even if there is no device attached to the router's output at the moment.

The **Factory EDID List** shows the factory memory locations (01# - 50#) with preprogrammed EDID.

The **User EDID List** shows the memory locations (51# - 100#) which can be used by the user to save custom EDIDs.

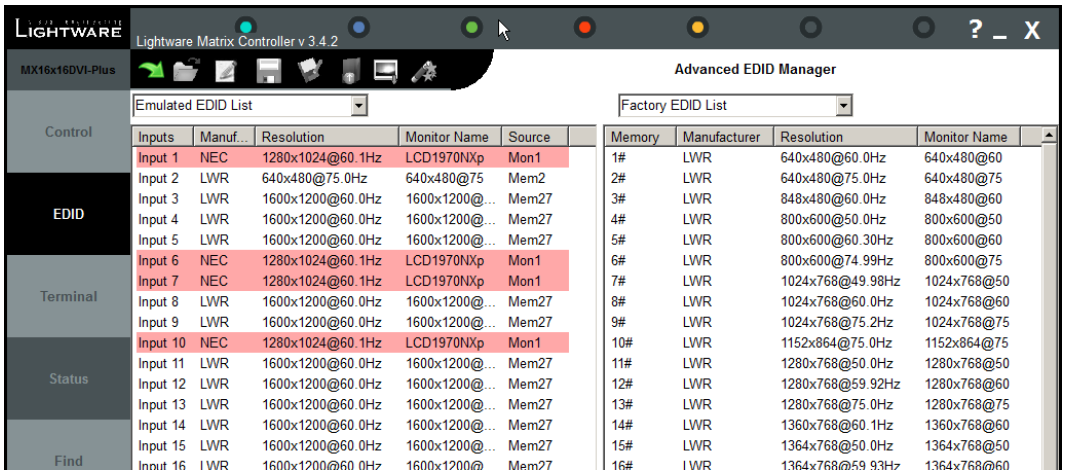


Figure 5-5. EDID Management menu

Info *The rows with red background are dynamically routed to the input.*

Any DVI source reads the EDID from the Emulated EDID memory for the corresponding port. The user can copy an EDID from any of the three EDID lists to the desired input's memory location. This is called EDID routing. There are two types of the emulation: static and dynamic.

- Static EDID emulation happens, when an EDID from the Factory or User EDID list is routed to an input
- Dynamic EDID emulation occurs, when an attached monitor's EDID is routed to an input. In this case the emulated EDID changes automatically, if a new monitor is attached to the output, by simply copying the data from the monitor.

Changing the emulated EDID at one or all inputs

Step 1. Select the Emulated EDID List in one of the list window areas in the drop down list.

Step 2. Select the desired EDID list in the other list window from which you want to copy (route) the EDID.

Step 3. To change the emulated EDID at

a) one input, drag and drop the EDID to the desired input location.

b) all inputs at the same time, right click on the desired new EDID and select "Switch to all Inputs" from the pop-up menu.

Step 4. Click Yes in the pop-up dialog window to confirm EDID change.

Info: *If dynamic emulation is established, the emulated EDID will be changed on all inputs that are affected, every time a new monitor is connected to the output which was the source of the dynamic EDID routing. If the monitor is disconnected from the output, the last EDID remains emulated for the sources. This feature helps especially rental technicians or system integrators to keep the source continuously transmitting the signal, and adopt the system for new incoming display devices.*

Info: *Power ON/OFF cycle will not affect the emulated EDID or other settings.*

Info: *EDID routing procedure causes a status change, hence it is reported back to the CONTROL SOFTWARE within 2-3 seconds.*

Learning EDID from attached display device

The system is able to learn the EDID from a connected display device and store it in one of the user programmable memory locations.

Step 1. Select the User Memory in the drop-down menu in one of the list windows.

Step 2. Select the EDID to be saved from the other list window.

Step 3. Drag and drop the selected EDID to the desired User Memory location.

Step 4. Click Yes in the pop-up dialog window to confirm EDID change.

Saving EDID from memory to file

The control software is able to download EDID from the matrix and to save it as an EDID file (.dat file extension).

Step 1. Right click on the EDID to be saved.

Step 2. Click on the "Save to file" in the pop-up window.

Step 3. The Matrix Controller Software downloads the desired EDID and a save dialog appears. It may take a few seconds to download the EDID. If the save dialog is shown, type in the file name, and press Save button. After the process was completed, an "EDID saved!" message confirms the command.

Load EDID from file to memory

The system is able to load EDID from a file located on the computer and store it in the matrix. EDID are stored in *.dat files.

Step 1. Select the User Memory list in one of the list windows.

Step 2. Right click on the desired memory location. Then select “Load from file” from the pop-up menu.

Step 3. Browse your hard drive to find the desired EDID file. The software checks whether the selected file is a valid EDID file.

Step 4. Click Open in the browser window. After the process finished, ”EDID Upload completed” message appears.

5.4.2. Advanced EDID Editor

This powerful tool is essential for AV professionals. The Lightware Advanced EDID Editor is integrated into the Lightware Matrix Controller software, and it makes possible to manage every setting in the EDID on an intuitive user interface. The editor can read and write all descriptors, which are defined in the standards, including the additional CEA extensions.

Any EDID from the router’s memory or a saved EDID file can be loaded in the editor. The software resolves the raw EDID, and displays it as readable information to the user. All descriptors can be edited, and saved in an EDID file, or uploaded to the router’s memory.

By clicking on the green arrow, the editor area rolls down.

When the user enters the menu for the first time, an empty EDID is loaded into the editor’s memory.

All EDID in the router’s memory can be edited in the following way:

Step 1. Right click on the desired EDID to be loaded to the EDID Editor.

Step 2. In the pop-up menu, click on Edit EDID. The editor area automatically rolls down, and the EDID is loaded into the editor area.

For further information, see the user’s manual of Advanced EDID Editor on the Lightware website: *www.lightware.eu*

5.4.3. Easy EDID Creator

Since the above mentioned advanced editor needs more complex knowledge about EDID, Lightware introduced a wizard like interface for fast and easy EDID creation. With Lightware Easy EDID Creator it is possible to create custom EDIDs in four simple steps.

By clicking on the wizard icon, the Easy EDID Creator opens in a new window.

For further information, see the user’s manual of Easy EDID Creator on the Lightware website: *www.lightware.eu*

5.5. Terminal menu

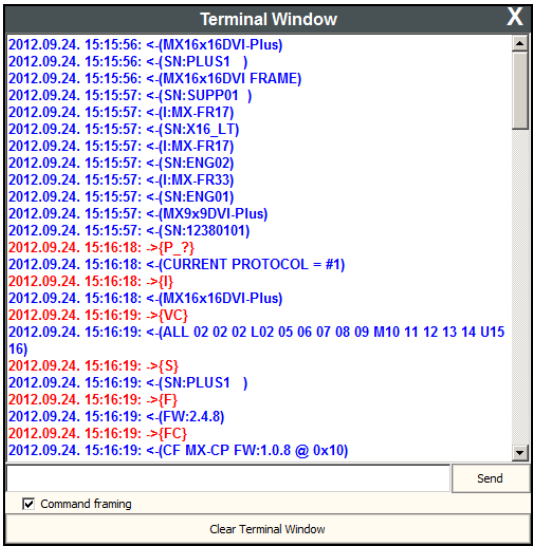


Figure 5-6. Terminal window

This general-purpose serial terminal is intended mainly for testing and debugging purposes. After a successful connection is established with a router this terminal can be used either via serial or TCP/IP connection. All commands can be used here that are discussed in *Programmers reference*, chapter *8*, on page *50*. The text can be typed directly.

By default commands are automatically surrounded by framing brackets. Every sent command and every received response gets an arrow (-> or <-) prefix, and has different font colors in order to help distinguishing.

If the "Command framing" checkbox is unchecked, you can send multiple commands together, however in this case you have to type in the framing brackets manually.

5.6. Status menu

Basic device information, such as the installed boards' firmware and hardware revisions are displayed in this window.

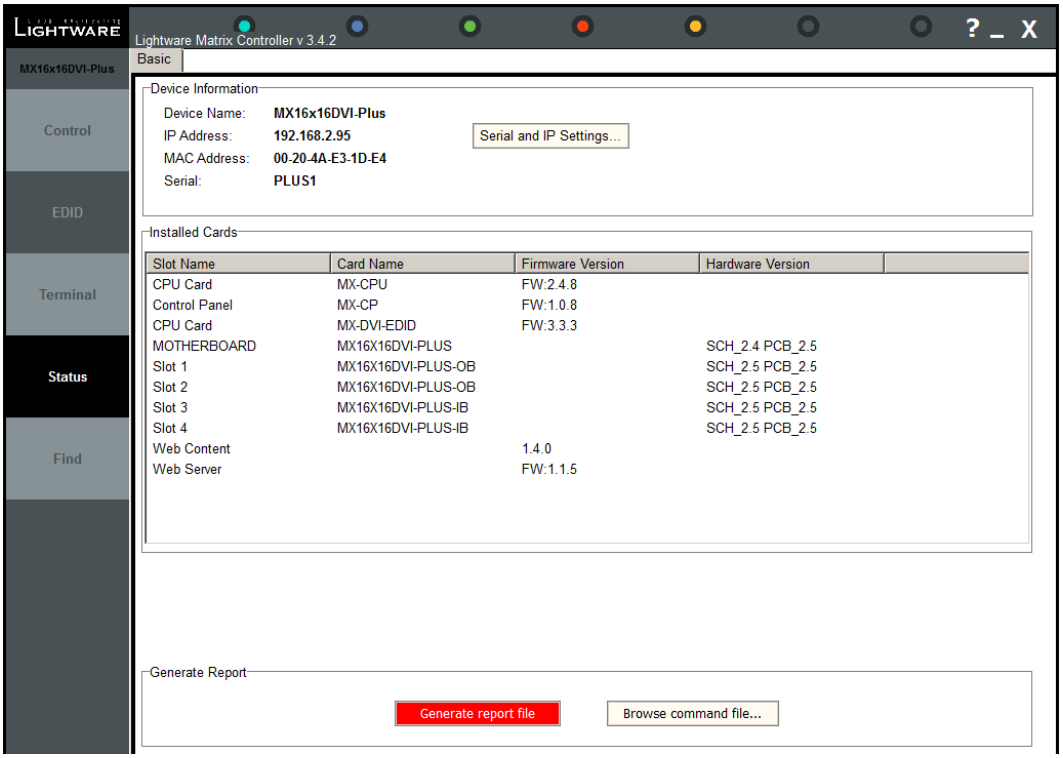


Figure 5-7. Status menu

Info: *If the device is connected via RS-232, the IP address field shows "serial connection" instead of the IP address.*

If the matrix is connected via IP connection, the serial and IP settings can be viewed by clicking on the "Serial and IP Settings..." button.

5.6.1. IP settings

Obtain IP address automatically

By selecting the “Obtain IP address automatically” option, the matrix gets the IP address from the DHCP server on the LAN, or if DHCP server is not present, it gets an AutoIP address from the 169.254.xxx.xxx domain.

Fix IP configuration

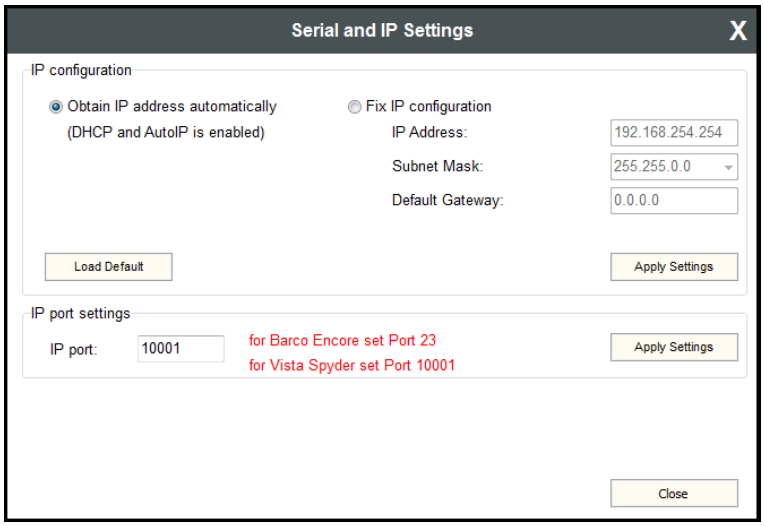
In this case, the matrix has an IP address configuration set up by the user/administrator. The earlier saved configuration is shown in brackets.

Step 1. Select the “Fix IP configuration” option.

Step 2. Type in the IP address, select the desired subnet mask and type in the gateway IP address.

Step 3. Click on “Apply Settings” button. Depending on the modified settings, you might need to restart the router and the Matrix Controller Software.

Step 4. Click to the Close button to close this window and step back to the Status menu.



Info: *The “Load Default” button loads the factory default IP settings to the fields, which contain a fix configuration:*

IP Address: *192.168.254.254*
Subnet Mask: *255.255.0.0*
Default Gateway: *0.0.0.0*

IP port settings

The router can be accessed via this TCP/IP port number with TCP connection. This number can be modified to any number between 1025 - 65535 except the followings: 9999, 14000 - 14009, 30704, and 30718.

The port 23 is accepted for Barco Encore. To use the matrix with the Vista Spyder set port to 10001.

Step 1. Type the desired port number into the textbox.

Step 2. Click on “Apply Settings” button. Depending on the modified settings, you might need to restart the router and the Matrix Controller Software.

Step 3. Step 4. Click to the Close button to close this window and step back to the Status menu.

Info: *The IP port number is 10001 by default.*

5.6.2. Generate report file

Lightware Matrix Controller allows user to generate a standard report file which contains basic information about the health and the version numbers of the matrix.

Info *User's issues can be solved easier by Lightware technical support if the generated report file was sent.*

To generate Standard Report:

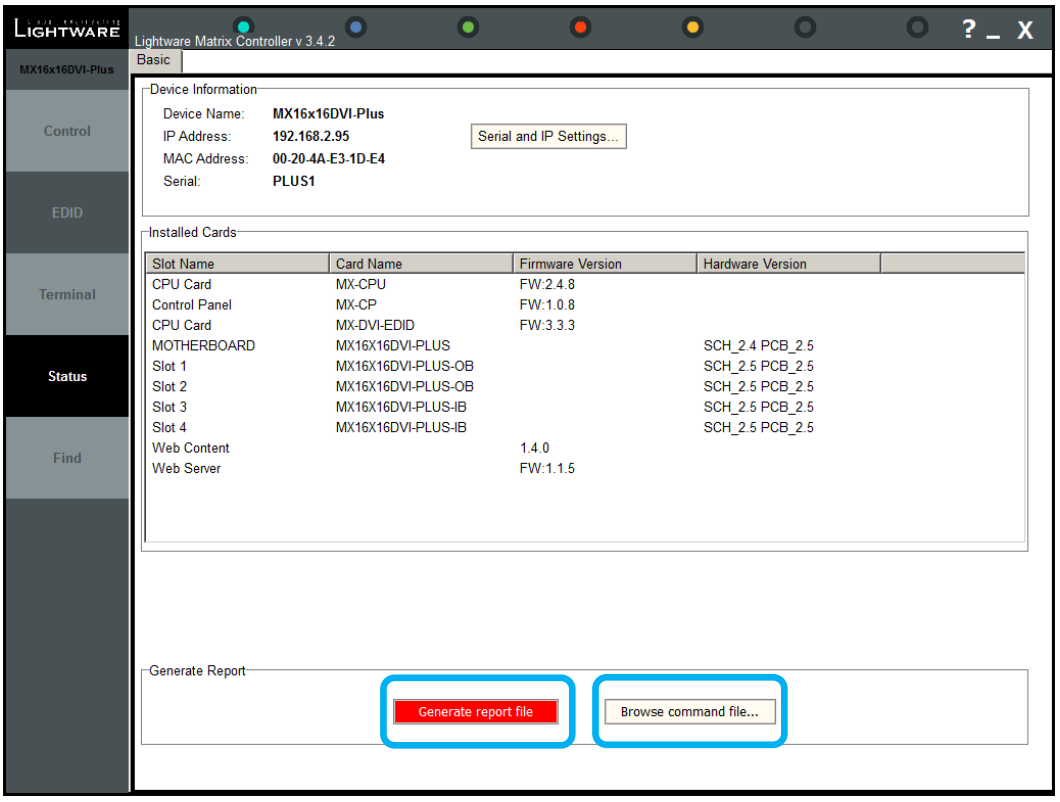
Step 1. Click on the "Generate report file button". A browser window will be opened.

Step 2. Choose the location of the report file and click on the save button. The report generating will be start immediately. The default file name is: *Lightware_matrix_standard_report_date@time.lwr*

Step 3. During the process a red "Generating standard report…" message will be appeared.

Important *Let the Lightware Matrix Controller software to finish the process! Do not exit or select another menu item.*

Step 4. After finishing a window explorer will be opened and shown the actual folder which contains the generated report file.



5.6.3. Browse command file

Lightware Matrix Controller software can run a special command file. After running the software save a result file. It is useful for debugging for the Lightware technical support.

If a command file was sent:

Step 1. Save it to the computer.

Step 2. Click to the 'Brose command file…' button. A browser window will be opened.

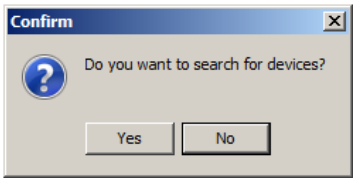
Step 3. Choose the command file. Another browser window will be appeared where the generated result file will be saved.

Step 4. Choose the location of the report file and click on the save button. The report generating will be start immediately. The default file name is: *Lightware_matrix_standard_report_dd_mm_yyyy@hh_mm.lwr*

Step 5. During the process a red “Generating report…” message will be appeared.

Important *Let the Lightware Matrix Controller software to finish the process! Do not exit or select another menu item.*

5.7. Find menu



By clicking this menu, the available devices can be rescanned on the serial port and on the Ethernet. If the Matrix Controller Software has a live connection to a device on a port, a question window appears, asking if you really want to search for devices.

Clicking Yes will open the Find window. See section 5.2 about establishing the connection on page 27.

Clicking No will close the pop up window, the original connection remains active.

6. Web control – Using built-in website

Lightware matrices have a built-in web page, which can be accessed over TCP/IP protocol and offers you full control over all settings even if you don't have the opportunity to install new programs. The router's built-in website is compatible with most widely spread browsers and requires no additional software components such as ActiveX controls.

To access the webpage just run your preferred web browser and type the IP address of the router as URL. The computer and the router have to be in the same subnet.

Info: *The only way to find out the router's IP address (if it is not known) is to search for devices with the Matrix Controller software. If this is not possible for some reason, the IP address can be reset to factory default (192.168.254.254) with the front panel buttons. See section 4.3.5 on page 24 for details.*

Info: *Only one opened web page is allowed simultaneously. Other TCP/IP connections are prohibited while the web page is opened. Using more instances of the web page simultaneously will result in inadequate operations.*

Info *Some of the Lightware Matrix Controller functions are not available in the built-in website. Please read section 4.3.2 on page 23 to compare the user interfaces.*

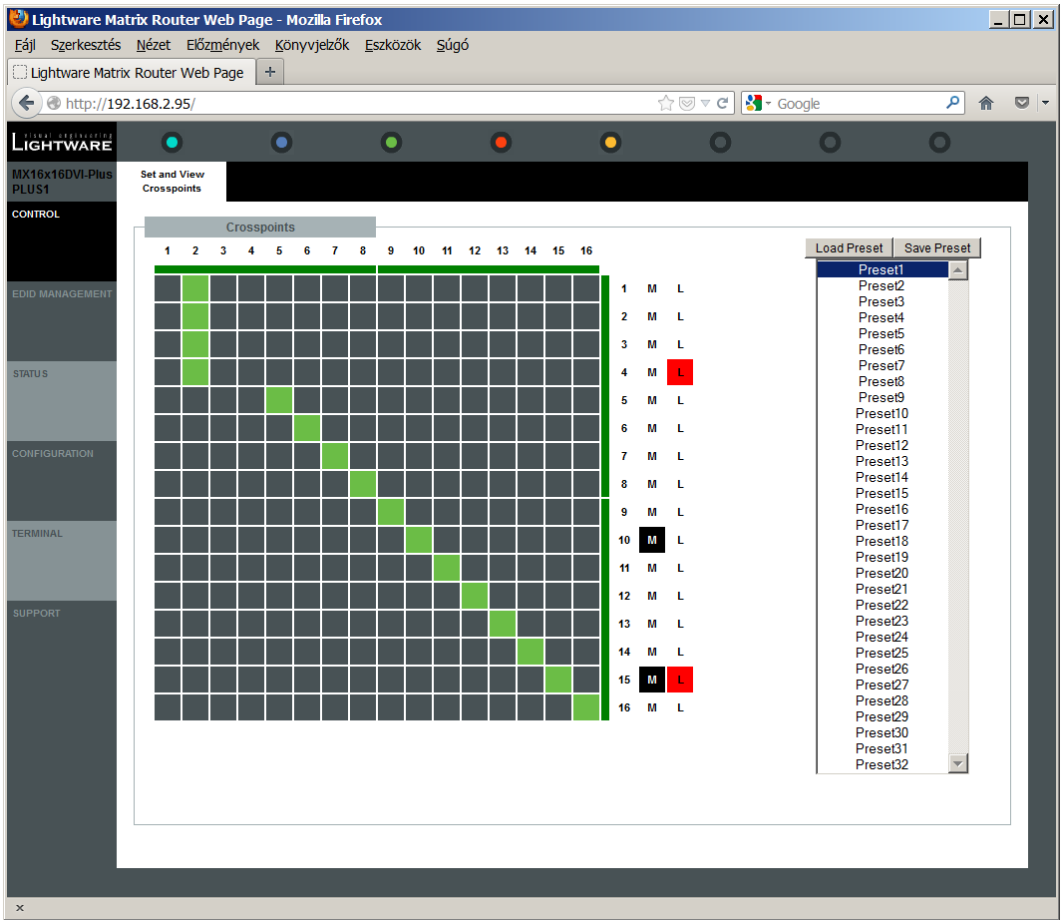


Figure 6-1. Built-in website main page

6.1. Menu description

The built-in website contains the following menus and submenus:

Control

Set and View Crosspoints

This menu appears by default, when accessing the website.

It contains a matrix button area according to the input and output numbers of the router. Columns are representing the inputs, while rows are the outputs. The green squares represent the state of the matrix switcher.

The Preset selection box is on the right side of this page.

EDID Management

By clicking on this menu, the built-in website downloads the EDID list from the matrix. The user can view and switch the EDIDs.

Status

Basic device information such as the serial number, installed cards firmware, and hardware versions are displayed on this page.

Configuration

This page shows the current network configuration of the matrix, such as IP settings and port number.

Terminal

The general-purpose web terminal is intended mainly for testing and debugging purposes.

Support

The contact information to Lightware Visual Engineering is shown in this page.

6.2. Control menu

6.2.1. Port status

To help identifying connected sources and sinks inputs' and outputs' name and the information of the presented audio and video signal are shown. The background of input and output port labels are colored depending on port status.

Legend for input ports	Legend for output ports
No source connected; or no information available	No sink connected; or no information available
+5V is present from the source; (source connected*)	Hotplug is present

Info *The matrix can sense only the connecting of input and output devices. There is no information about the signal type or the valid video stream.*

6.2.2. Crosspoint switching

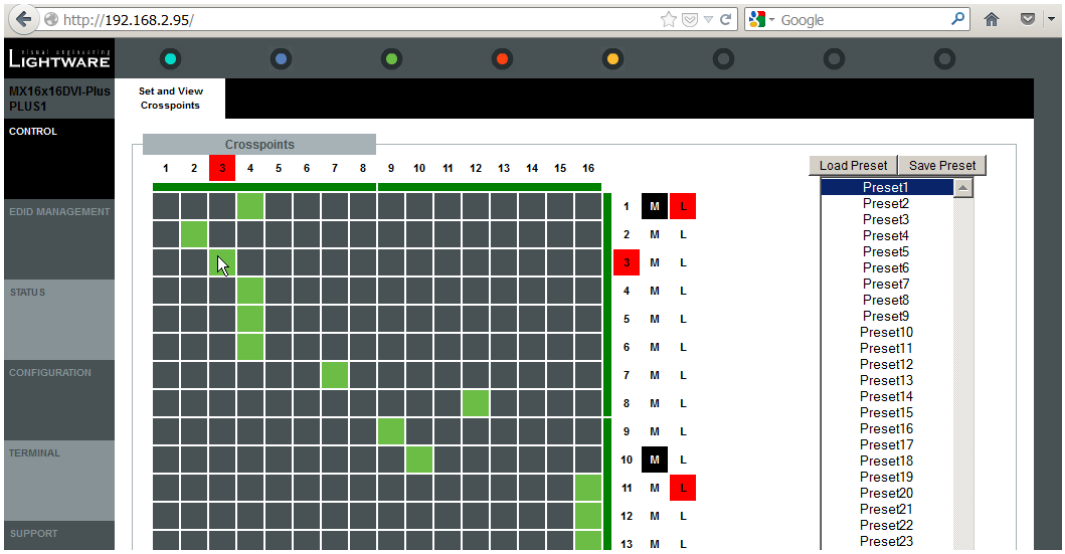


Figure 6-2. Built-in website crosspoint array

This menu contains the crosspoint area and the preset area. After connecting to a new device, this menu appears by default.

1; 2; 3… columns represent the inputs, and the 1; 2; 3… rows represent the outputs. Each green square represents a live connection. For making a connection click on the desired grey square. When the mouse pointer hovers over the array, the corresponding input and output numbers are highlighted in red to help switching.

6.2.3. Mute outputs

Outputs can be easily muted by clicking the button titled 'M' beside the output. This means that no signal will be present at this output. If muting is active the background turns to black.

6.2.4. Lock outputs

Outputs can be locked to any inputs. After locking an input to an output no switching is permitted for this output unless it is unlocked again. If lock is active, background turns to red.

Info: *Loading a preset doesn't change neither the lock state nor the switch state of a locked output. If an output is locked to an input before preset loading, it will also be locked that input after preset loading, so locked outputs ignore the preset.*

6.2.5. Preset operations

Preset operations can be done in the right panel of the **Control → Set and View Crosspoints** page. Each Lightware matrix switcher has 32 preset memories that can be loaded and saved any time. The higher numbered presets are accessible only through software control.

Info: *A preset setting stores a full configuration of all outputs, so preset loading have an effect on every output, except the locked ones.*

Save Preset

Step 1. Make the desired configuration on matrix switching area.

Step 2. Select the preset memory location (Preset1...Preset32) where you want to save your configuration to.

Step 3. Press the Save Preset button. A message box confirms that the preset is stored.

Load Preset

Step 1. Select the preset memory location (Preset1...Preset32) you want to load as next configuration.

Step 2. Press the Load Preset button. Now the preset is loaded

Step 3. The new I/O configuration is displayed on the matrix switching area.

6.3. EDID menu

By clicking on the **EDID MANAGEMENT** menu, the EDID Router page appears.

When the user enters the menu first, the whole EDID list is being downloaded from the matrix. It may take up to 40 seconds for the first time. After the list is downloaded, the current status of the router's EDID is shown in the three boxes.

The **Emulated EDID** list contains the resolutions and the vendor names of the EDID reported to the source for each input separately.

The **Last attached Monitor's EDID** list contains the resolutions and vendor names of the display devices connected to matrix switcher's output.

The **Factory EDID List** shows the factory memory locations (01# - 50#) with preprogrammed EDID.

The **User EDID List** shows the memory locations (51# - 100#) which can be used by the user to save custom EDIDs.

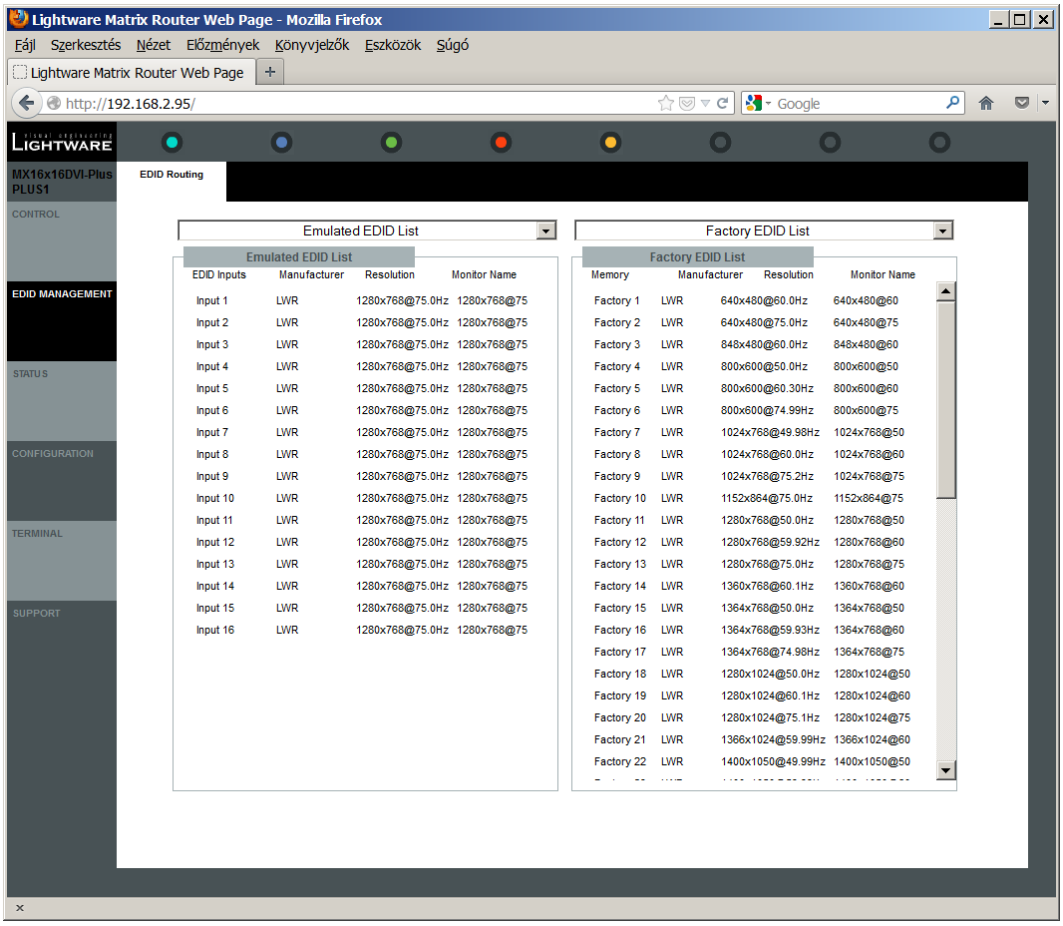


Figure 6-3. EDID lists

6.3.1. Change emulated EDID at one or all inputs

Step 1. Select the Emulated EDID List in one of the window areas in the drop down list.

Step 2. Select the desired EDID List in another window area in the drop down list.

Step 3. Select the desired EDID from this list with a left mouse click, a popup message appears. (Memory location, manufacturer, Resolution and Monitor name of the selected EDID)

Step 4. Click on the desired memory location in the Emulated EDID List window, or the "Switch to all input" button. Now the EDID has been changed on selected input. If the EDID changing was successful a reply message will be appeared on the bottom of the page.

Step 5. Click on the "Cancel" button to exit EDID changing.

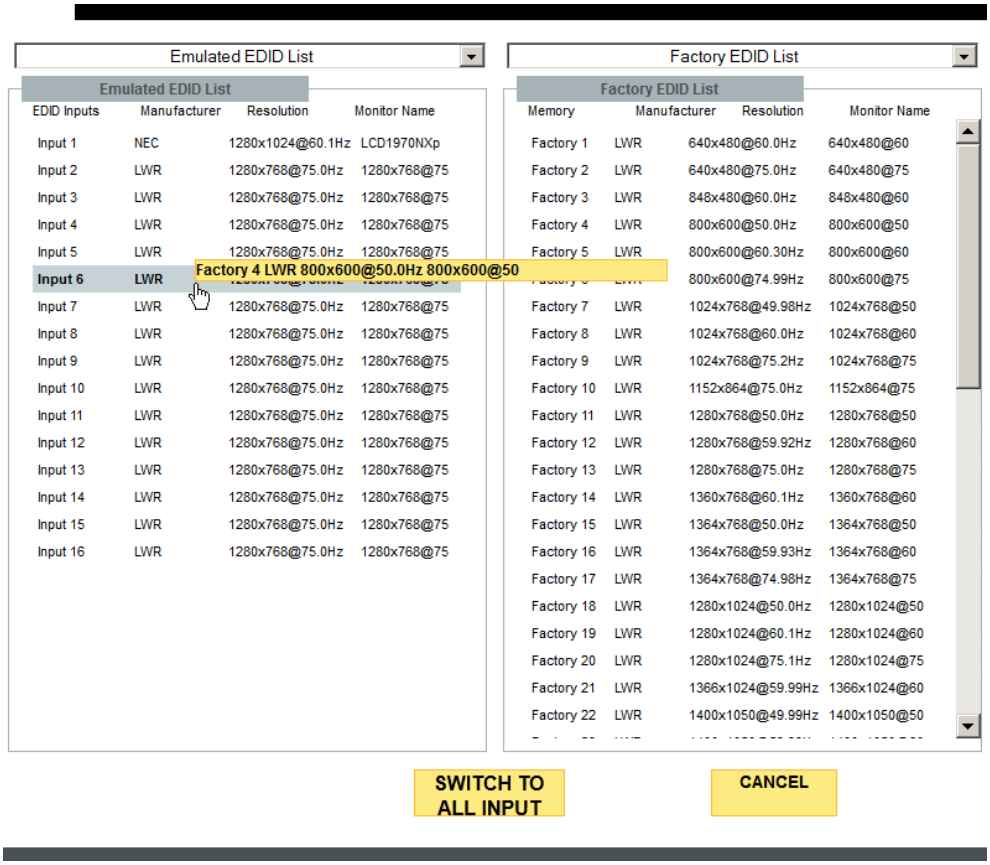


Figure 6-4. Static EDID routing

Info: *Switching an EDID to ALL inputs may take several seconds.*

The user can switch and learn EDIDs also in the **Last Attached Monitors EDIDs** window. Switching an EDID from this list to an input results dynamic EDID routing. This means that the emulated EDID changes automatically, if a new monitor is attached to the output, by simply copying the data from the monitor.

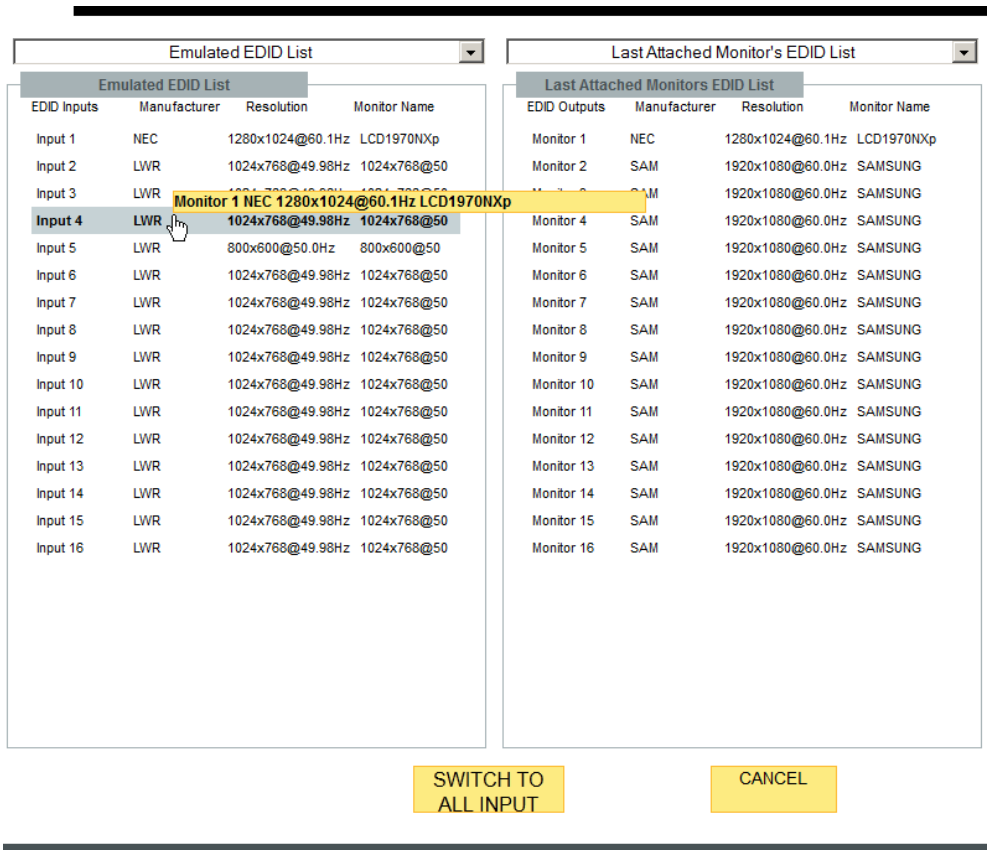


Figure 6-5. Dynamic EDID routing

6.4. Status menu

Basic device information, such as the installed cards‟ firmware and hardware revisions are displayed in this window.

6.4.1. Generate report file

The built-in website allows user to generate a standard report file which contains basic information about the health and the version numbers of the matrix.

Info *User's issues can be solved easier by Lightware technical support if the generated report file was sent.*

To generate Standard Report:

Step 1. Click on the "Generate report file button". The report generating will be start immediately.

Step 2. During the process a red "Generating report…" message will be appeared.

Important *Let the Lightware Matrix Controller software to finish the process! Do not exit or select another menu item.*

Step 3. *After finishing a red "The report is now ready. Click HERE to download it." message will be appeared. Click on this message to download the report file to the computer. A browser window will be opened.*

Step 4. Choose the location of the report file and click on the save button.
The default file name is:
Lightware_matrix_standard_report_devicename_serialnumber_date_time_.txt

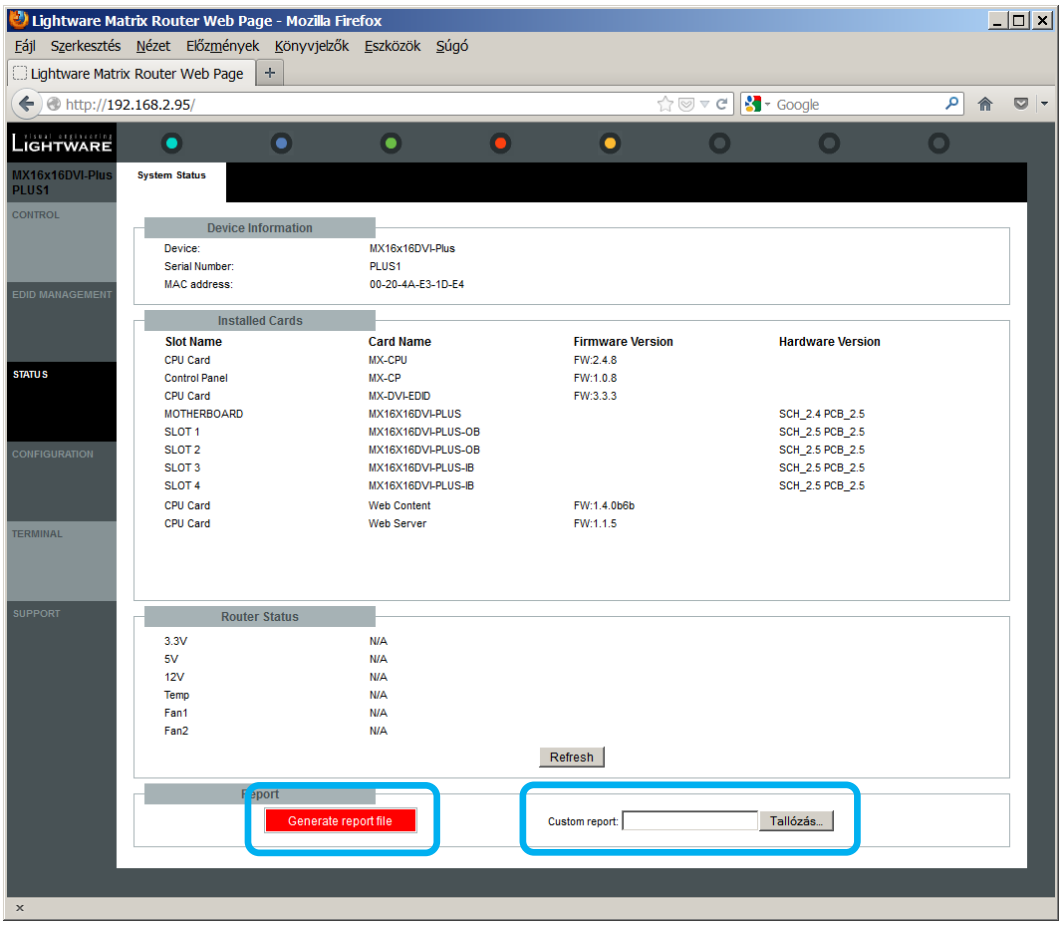


Figure 6-6. Status menu

6.4.2. Generate custom report

The built-in website can run a special command file. After running the software save a result file. It is useful for debugging for the Lightware technical support.

If a command file was sent:

Step 1. Save it to the computer.

Step 2. Click to the 'Brose…' button or into the text box. A browser window will be opened.

Step 3. Choose the command file. Generating will start automatically.

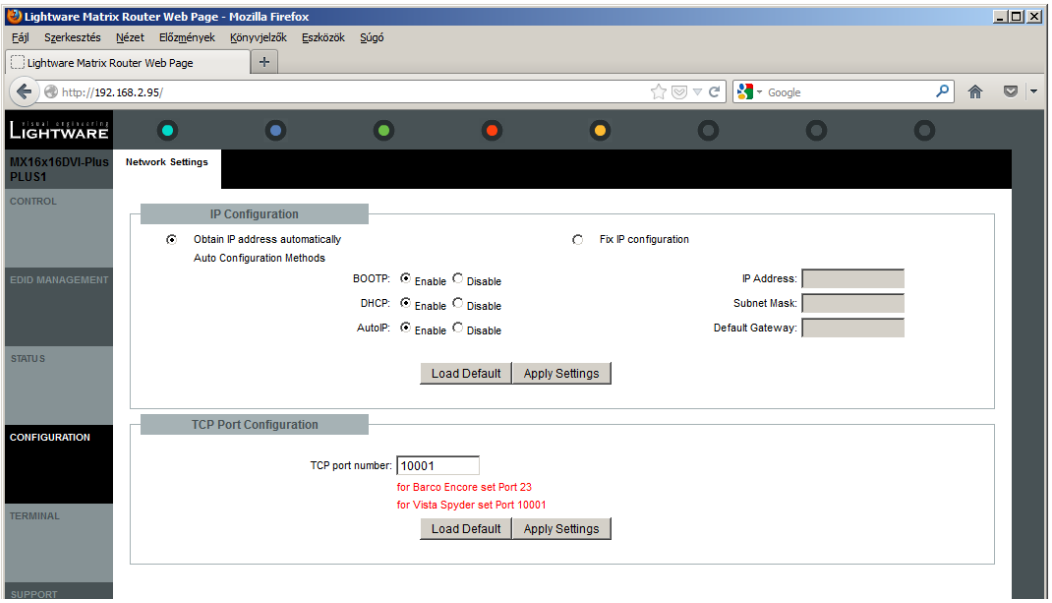
Step 4. During the process a red "Generating report…" message will be appeared.

Important *Let the Lightware Matrix Controller software to finish the process! Do not exit or select another menu item.*

Step 5. *After finishing a red "The report is now ready. Click HERE to download it." message will be appeared. Click on this message to download the report file to the computer. A browser window will be opened.*

Step 6. Choose the location of the report file and click on the save button.
The default file name is:
Lightware_matrix_standard_report_devicename_serialnumber_date_time_.txt

6.5. Configuration menu



The unit's network values are displayed when you select Configuration menu.

Info: *It is possible to reload factory default IP setup using the front panel buttons. See section 4.3.5 on page 24 about this.*

6.5.1. Automatic IP Address Configuration

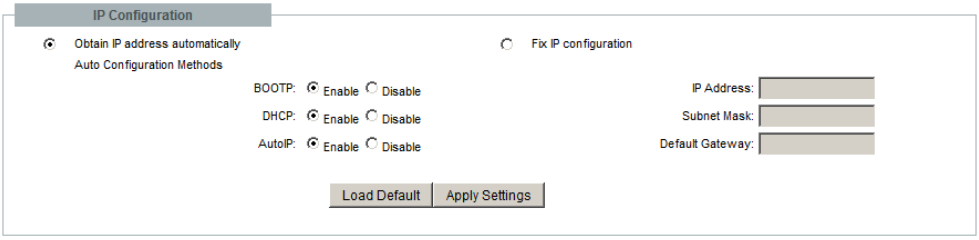
The matrix switcher supports three of the most used automatic IP configuration protocols.

To assign IP address automatically:

Step 1. Click on Configuration menu.

Step 2. Select Obtain IP address automatically.

Step 3. Enter the following (as necessary):



BOOTP Select **Enable** to permit the Bootstrap Protocol (BOOTP) server to assign the IP address from a pool of addresses automatically.

DHCP Select **Enable** to permit the Dynamic Host Configuration Protocol (DHCP) server to assign leased IP address to the matrix unit automatically.

AutoIP Select Enable to permit the matrix to generate an IP in the 169.254.x.x address range with Class B subnet.

Info: *Disabling BOOTP, DHCP, and AutoIP (all three checkboxes) is not advised as the only available IP assignment method will then be ARP or serial port.*

Step 4. When you are finished, click Apply Settings button.

Info: *To continue using the built-in website, you must type in the IP address in your browser.*

6.5.2. Static IP address configuration

The user can manually assign an IP address to the unit, and enter related network settings.

To assign an IP address manually:

Step 1. Click on Configuration menu.

Step 2. Select Fix IP Configuration.

Step 3. Enter the following (as necessary):

IP Address If DHCP is not used to assign IP addresses, enter it manually in decimal-dot notation. The IP addresses must be set to a unique value in the network.

Subnet Mask A subnet mask defines the number of bits taken from the IP address that are assigned for the host part.

Default Gateway The gateway address, or router, allows communication to another LAN segments. The gateway address should be the IP address of the router connected to the same LAN segment as the matrix. The gateway address must be within the local network.

Step 4. When you are finished, click Apply Settings button.

Info: *To continue using the built-in website, you must type in the IP address in your browser.*

6.5.3. Loading the default IP settings

Step 1. Click on the Load Default button. Now the factory default IP address, Subnet Mask and Gateway address is loaded into the input boxes. But they are not saved.

Step 2. To save the settings, click on Apply Settings button.

Step 3. The default fix IP settings are applied:

IP Address:	192.168.254.254
Subnet Mask:	255.255.0.0
Default Gateway:	0.0.0.0

6.5.4. TCP Port Configuration

The user can configure the TCP port number, which is used to communicate with the matrix router through LAN. The input box initially contains the current setting.

Step 1. Type the desired TCP port number into the input box

Step 2. Press the Apply Settings button. The new port will be active after the next connection.

6.5.5. Loading the default TCP Port settings

Step 1. Click on Load Default button. Now the factory default value is in the input box, but it is not saved.

Step 2. To save, click on Apply Settings button. The new port will be active after the next connection.

6.6. Terminal

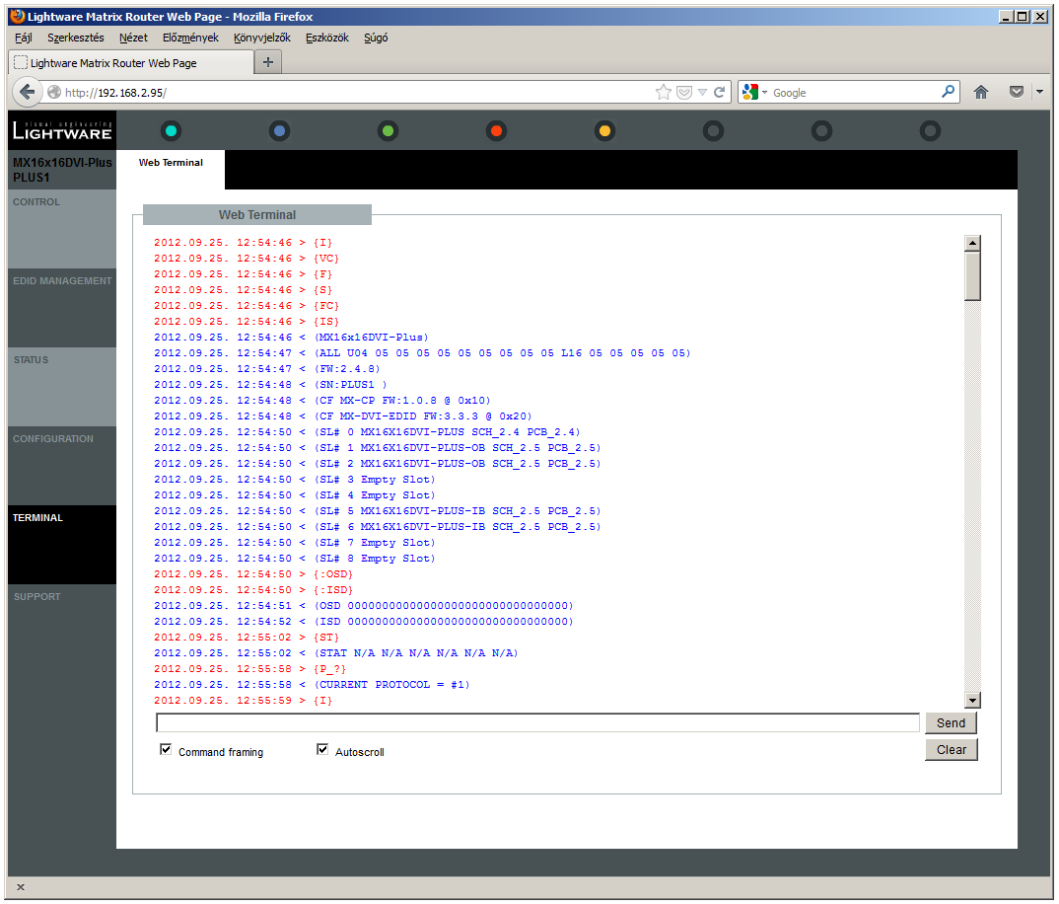


Figure 6-7. Web terminal window

This general-purpose web terminal is intended mainly for test and debugs purposes. After a successful connection is established with a router this terminal can be used. All commands can be used here that are discussed in *Programmers reference*, chapter 8, on page 50. The text can be typed directly into the textbox.

By default commands are automatically surrounded by framing brackets. Every sent command and every received response gets an arrow (-> or <-) prefix, and has different font colors in order to help distinguishing.

If the “Command framing” checkbox is unchecked, you can send multiple commands together, however in this case you have to type in the framing brackets manually.

If the Autoscroll checkbox is unchecked user should use the scroll bar to see the last commands.

6.7. Support

For technical support, please don’t hesitate to contact Lightware Visual Engineering at support@lightware.eu

7. About EDID memory

EDID router contains a 164 block non-volatile memory bank. EDID memory is structured as follows:

1..50 .....Factory Preset EDID list

51..100 ..... User programmable memories

101..116 (DVI_OUT_1...16)* .....Last attached monitor's EDID list

133..148 (DVI_IN_1...16)* .....Emulated EDID at input connectors

* Number of the inputs and outputs depends on the matrix size. (16, 12 or 9)

All EDID (including factory preset; user programmable memories; EDID at other inputs; and EDID at outputs) can be switched and emulated at any of the inputs.

Most of the factory preset EDIDs include only one resolution. This is to force the connected source to give a signal with the needed resolution. However there is a Universal EDID as well which allows many resolutions. Universal EDID (address 49) allows multiple resolutions including all common VESA defined resolutions. In addition, it also features audio support. The use of universal EDID is recommended for fast and easy system setup. Standalone MX DVI-Plus matrices can handle both 128 Byte EDID and 256 Byte extended EDID structures.

Info *The first 50 EDID (1…50 inclusive) are factory preprogrammed and cannot be modified. These are the most commonly used resolutions. The 30..45 memories and 49 (universal EDID) contain EDIDs supporting various embedded audio formats, for HDMI audio. Memory locations 117..132 and 148..164 are reserved for 32x32 matrix configurations only, therefore not accessible in these matrix routers.*

Info *The attached monitor's EDID is stored automatically, until a new monitor is attached to that particular output. In case of powering the unit off, the last attached monitor's EDID remains in non-volatile memory even is the monitor is unconnected.*

MEMORY	Resolution		MEMORY	Resolution
01	640 x 480 @ 60.0 Hz		**26**	1600 x 1200 @ 50.0 Hz
02	640 x 480 @ 75.0 Hz		**27**	1600 x 1200 @ 60.0 Hz
03	848 x 480 @ 60.0 Hz		**28**	1920 x 1200 @ 59.55 Hz
04	800 x 600 @ 50.0 Hz		**29**	1920 x 1200 @ 50.0 Hz
05	800 x 600 @ 60.30 Hz		**30**	1440 x 480i @ 60.3 Hz
06	800 x 600 @ 74.99 Hz		**31**	640 x 480 @ 59.94 Hz
07	1024 x 768 @ 49.98 Hz		**32**	720 x 480 @ 59.92 Hz
08	1024 x 768 @ 60.0 Hz		**33**	1440 x 576i @ 50.6 Hz
09	1024 x 768 @ 75.2 Hz		**34**	720 x 576 @ 50.0 Hz
10	1152 x 864 @ 75.0 Hz		**35**	1280 x 720 @ 50.0 Hz
11	1280 x 768 @ 50.0 Hz		**36**	1280 x 720 @ 60.0 Hz
12	1280 x 768 @ 59.92 Hz		**37**	1920 x1080i @ 50.3 Hz
13	1280 x 768 @ 75.0 Hz		**38**	1920 x1080i @ 50.0 Hz
14	1360 x 768 @ 60.1 Hz		**39**	1920 x1080i @ 60.5 Hz
15	1364 x 768 @ 50.0 Hz		**40**	1920 x 1080 @ 24.0 Hz
16	1364 x 768 @ 59.93 Hz		**41**	1920 x 1080 @ 24.99 Hz
17	1364 x 768 @ 74.98 Hz		**42**	1920 x 1080 @ 30.0 Hz
18	1280 x 1024 @ 50.0 Hz		**43**	1920 x 1080 @ 50.0 Hz
19	1280 x 1024 @ 60.1 Hz		**44**	1920 x 1080 @ 49.99 Hz
20	1280 x 1024 @ 75.1 Hz		**45**	1920 x 1080 @ 60.0 Hz
21	1366 x 1024 @ 59.99 Hz		**46**	2048 x 1080 @ 49.99 Hz
22	1400 x 1050 @ 49.99 Hz		**47**	2048 x 1080 @ 50.0 Hz
23	1400 x 1050 @ 59.99 Hz		**48**	2048 x 1080 @ 59.99 Hz
24	1400 x 1050 @ 75.0 Hz		**49**	Universal EDID
25	1680 x 1050 @ 59.99 Hz		**50**	2560 x 1600 @ 59.85 Hz

Table 7-1. Factory preset EDID list

8. Programmers reference

Users can connect to the matrix through Ethernet or serial port. After establishing connection, there is no difference between connection types (except some rare cases, which are uniquely noted).

Lightware matrix routers can be controlled with external devices which can communicate according to the router protocol. Lightware routers have a special protocol, but to interoperate with third party devices, a secondary protocol is also provided.

Please see section 4.3 on page 23 about remote operation and connection setup.

8.1. Changing protocols

The router is equipped with multiple router protocols.

The currently used protocol can be viewed or changed any time on the matrix front panel (see 4.3.6 on page 25) or with protocol commands (see 8.6.7 and 8.6.8 on page 61).

8.2. Protocol description

The protocol description hereinafter stands for Lightware protocol.

The matrices accept commands surrounded by curly brackets - { } - and responds data surrounded by round brackets - ( ) - only if a command was successfully executed. All input commands are converted to uppercase, but respond commands can contain upper and lower case letters as well.

Legend for control commands:

<in>	=	input number in 1 or 2 digit ASCII format (01,5,07,16 etc.)
<out>	=	output number in 1 or 2 digit ASCII format
<in²>	=	input number in 2 digit ASCII format (01, 02, 10, 12 etc.)
<out²>	=	output number in 2 digit ASCII format (01, 02, 10, 12 etc.)
<loc>	=	location number in 1, 2 or 3 digit ASCII format
<id>	=	id number in 1 or 2 digit ASCII format
<id²>	=	id number in 2 digit ASCII format
<*italic*>	=	italic parameters are optional
CrLf	=	Carriage return, Line feed (0x0D, 0x0A)
●	=	space character (0x20)
→	=	each command issued by the controller
←	=	each response received from the router

8.3. Batch commands

Usually the commands are sent one by one to the router, but this is not a must. Any command can be send to the router in a batch. To do this, just use the same commands (including { } brackets), but put the "*CrLf*" only at the end of the batch.

In most cases, batch commands are processed just as if they were sent one by one, but for switching commands, the router groups them, and executes switching in one step. The grouping is done only if the switching commands are received after each other, without any interruption (e.g. other command sent between switch commands). In this case, the response format changes, as not only one output's state changed. The response will be in the format as if {VC} were sent.

The below example shows a batch command that resulted group switching:

One by one commands	**Batch commands** (MX16x16DVI-Plus)
→ {02@01}CrLf ← (O01 I02)CrLf	→ {02@01}{04@03}CrLf ← (ALL 02 01 04 01 05 05 05 05 05 05 05 05 05 05 05 05)CrLf
→ {04@03}CrLf ← (O03 I04)CrLf	

The below example shows a batch command that does not resulted group switching, because another command get between:

One by one commands	Batch commands
→ {02@01}CrLf ← (O01 I02)CrLf	→ {02@01}{+04}{04@03}CrLf ← (O01 I02)CrLf
→ {+04}CrLf ← (0MT04)CrLf	← (0MT04)CrLf
→ {04@03}CrLf ← (O03 I04)CrLf	← (O03 I04)CrLf

8.4. Switching and control commands

8.4.1. Switch one input to one output

Description: Switch input <in> to output <out>.

Format	Example
Command {<in>@<out>}	→ {1@5}
Response (O<out²>●I<in²>)CrLf	← (O05 I01)CrLf

Explanation: Input 1 is switched to output 5.

8.4.2. Switch one input to all outputs

Description: Switch input <in> to all outputs.

Format	Example
Command {<in>@O}	→ {02@o}
Response (I<in²>●ALL)CrLf	← (I01 ALL)CrLf

Explanation: Input 2 is switched to all outputs.

8.4.3. View connection on the specified output

Info *Obsolete! Use {VC} instead*

Description: View connection on output <out>.

Format	Example
Command {?<out>}	→ {?05}
Response (O<out²>●I<in²>)CrLf	← (O05 I01)CrLf

Explanation: Viewing connection for output 5. The connected input is 1.

Info *If the output is locked, muted, or both locked and muted, the response format changes. If the output is muted you get a letter 'M', if locked a letter 'L' and if muted and locked at the same time 'U' before the 2 digit numbers (e. g. O05 IL01).*

8.4.4. View connection on all outputs

Description: Viewing all outputs' connection results in different response length, because it depends on the router's type (length = 16 for MX16x16DVI-Plus, length = 12 for MX12x12DVI-Plus and length = 9 for MX9x9DVI-Plus). The response below supposes a router having 16 outputs.

Format		**Example 1** (MX16x16DVI-Plus)
Command	{VC}	→ {vc}
Response	(ALL●<O1>●<O2>●<O3> ●<O4>●<O5>●<O6>●<O7> ●<O8>●<O9>●<O10> ●<O11>●<O12>●<O13> ●<O14>●<O15>●<O16>)CrLf	← (ALL 02 02 02 05 05 05 08 08 08 08 08 08 08 08 08 08)CrLf

Legend 1: All <Ox> indexes show the corresponding output's connection state. If value <O5> equals 04 it means that output 5 is connected to input 4. <O1>..<O8> are two digit ASCII characters (01, 02, 04, etc.).

Explanation 1: Viewing connection for all outputs. Input 2 is connected to outputs 1, 2 and 3. Input 5 is connected to outputs 4, 5 and 6. Input 8 is connected to outputs 7 through 16.

Info

If an output is locked, muted, or both locked and muted, the response format changes. If outputs are muted you get a letter 'M', if locked a letter 'L' and if muted and locked at the same time 'U' before the 2 digit numbers.

Format		**Example 2** (MX16x16DVI-Plus)
Command	{VC}	→ {vc}
Response	(ALL●<O1>●<O2>●<O3> ●<O4>●<O5>●<O6>●<O7> ●<O8>●<O9>●<O10> ●<O11>●<O121>●<O13> ●<O14>●<O15>●<O16>)CrLf	← (ALL M02 L02 U02 05 05 05 08 08 08 08 08 08 08 08 08 08)CrLf

Legend 2: Any <Ox> indexes can be a two digit number, or there can be a leading character showing the mute and/or lock state for the corresponding output.

Index	Legend	Explanation
<Ox>	<in²>	<Ox> is connected to <in²>, <Ox> neither muted nor locked.
<Ox>	M<in²>	<Ox> is connected to <in²>, <Ox> is muted, and unlocked.
<Ox>	L<in²>	<Ox> is connected to <in²>, <Ox> is not muted, but locked.
<Ox>	U<in²>	<Ox> is connected to <in²>, <Ox> is muted and locked.

Explanation 2: Viewing connection for all outputs. Input 2 is connected to outputs 1, 2 and 3. Output 1 is muted. Output 2 is locked. Output 3 is muted and locked. Input 5 is connected to outputs 4, 5 and 6. Input 8 is connected to outputs 7 through 16.

8.4.5. View mutes on all outputs

Description: Viewing all outputs' connection results in different response length, because it depends on the router's type (length = 16 for MX16x16DVI-Slim, length = 12 for MX12x12DVI-Slim and length = 9 for MX9x9DVI-Plus). The response below supposes a router having 16 outputs.

Format		**Example** (MX16x16DVI-Plus)
Command	{VM}	→ {vm}
Response	(MUT●<M1>●<M2>●<M3>●<M4>●<M5>●<M6>●<M7>●<M8>●<M9>●<M10>●<M11>●<M12>●<M13>●<M14>●<M15>●<M16>)CrLf	← (MUT 1 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0)CrLf

Legend: All <Mx> indexes are one digit numbers, showing the mute state for the corresponding output. If <Mx> equals 0 the output x is unmated. If <Mx> equals 1, the output x is muted.

Explanation: Output 1, 3 and 4 are muted, the other outputs are not muted.

8.4.6. Mute specified output

Description: Mute output <out>.

Format		Example
Command	{#<out>}	→ {#03}
Response	(1MT<out²>)CrLf	← (1MT03)CrLf

Explanation: Output 3 is muted. Now no signal presents on output 3.

8.4.7. Unmute specified output

Description: Unmute output <out>.

Format		Example
Command	{+<out>}	→ {+03}
Response	(0MT<out²>)CrLf	← (0MT03)CrLf

Explanation: Output 3 is unmuted. Now output 3 is switched to the input it was connected to prior to the mute command.

8.4.8. Lock specified output

Description: Lock output <out>. Output's state cannot be changed until unlocking.

Format		Example
Command	{#><out>}	→ {#>05}
Response	(1LO<out²>)CrLf	← (1LO05)CrLf

Explanation: Output 5 is locked.

8.4.9. Unlock specified output

Description: Unlock output <out>. Now output 3 state can be changed.

Format		Example
Command	{+<<out>}	→ {+<05}
Response	(0LO<out²>)CrLf	← (0LO05)CrLf

Explanation: Output 5 is unlocked.

Info *The router issues the above response regardless of the previous state of the output (either it was locked or unlocked).*

8.4.10. Save preset to the specified memory location

Description: Save current crosspoint configuration (output states) to preset <id>.

Format	Example
Command {$<id>} Response (SPR<id²>)CrLf	→ {$4} ← (SPR04)CrLf

Explanation: Current crosspoint state is saved to preset 4, including the mute state of the outputs.

Info: *Lock states are not saved. Lock state is assigned to the physical output of the router. Presets don't affect output locks.*

8.4.11. Load preset from the specified location

Description: Load preset <id>.

Format	Example
Command {%<id>} Response (LPR<id²>)CrLf	→ {%4} ← (LPR04)CrLf

Explanation: Current crosspoint state is changed according to preset 4, including the mute state of the outputs.

Info: *Locked outputs are left unchanged. Presets don't affect output locks.*

8.4.12. Preview preset

Description: Preview preset <id> without loading.

Format	**Example** (MX16x16DVI-Plus)
Command {VP#<id>=?} Response (VP#<id>=●<O1>●<O2> ●<O3>●<O4>●<O5>●<O6> ●<O7>●<O8>●<O9>●<O10> ●<O11>●<O121>●<O13> ●<O14>●<O15>●<O16>)CrLf	→ {vp#3=?} ← (VP#3= 02 M02 M01 02 02 01 01 01 01 01 01 01 01 01 01 01)CrLf

Legend: Any <Ox> indexes can be a two digit number, or there can be a leading character showing the mute state for the corresponding output.

Explanation: Viewing connections for preset 3. Input 2 is connected to outputs 1, 2, 4 and 5. Input 1 is connected to all other outputs. Outputs 2 and 3 are muted. The shown input connections for these outputs are not active, but the last connection that was routed to that output before it was muted.

Index	Legend	Explanation
<Ox>	<in²>	<Ox> is connected to <in²>, <Ox> is not muted.
<Ox>	M<in²>	<Ox> is connected to <in²>, <Ox> is muted.

Renaming Presets / Inputs / Outputs

Description: Allows storing names for each preset / input / output. Any 16-byte long string is allowed. All characters are converted to uppercase! The router accepts <id> greater than the current I/O setup but treats it as modulo output. So if <id> = 17 on a 16x16 router, then it will be treated as 1. All router models have 32 presets memories.

8.4.13. Rename a preset

Format		Example
Command	{PNAME#<id>=<preset_name>}	→ {pname#1=first preset}
Response	(PNAME#<id>=<preset_name>)CrLf	← (PNAME#1=FIRST PRESET)CrLf

Explanation: Preset 1 was named as "first preset".

8.4.14. Rename an input

Format		Example
Command	{INAME#<id>=<input_name>}	→ {iname#3=Media Player}
Response	(INAME#<id>=<input_name>)CrLf	← (INAME#3=MEDIA PLAYER)CrLf

Explanation: Input 3 was named as "media player".

8.4.15. Rename an output

Format		Example
Command	{ONAME#<id>=<output_name>}	→ {oname#2=Monitor_no2}
Response	(ONAME#<id>=<output_name>)CrLf	← (ONAME#2=MONITOR_NO2)CrLf

Explanation: Output 2 was named as "monitor_no2".

Query names of Presets / Inputs / Outputs

Description: Each preset / input / output name can be read from the router.

8.4.16. Read a preset's name

Format		Example
Command	{PNAME#<id>=?}	→ {pname#1=?}
Response	(PNAME#<id>=<preset_name>)CrLf	← (PNAME#1=FIRST PRESET)CrLf

Explanation: Name for preset 1 is "first preset".

8.4.17. Read an input's name

Format		Example
Command	{INAME#<id>=?}	→ {iname#3=?}
Response	(INAME#<id>=<input_name>)CrLf	← (INAME#3=MEDIA PLAYER)CrLf

Explanation: Name for input 3 is "media player".

8.4.18. Read an output's name

Format		Example
Command	{ONAME#<id>=?}	→ {oname#2=?}
Response	(ONAME#<id>=<output_name>)CrLf	← (ONAME#2=MONITOR_NO2)CrLf

Explanation: Name for output 2 is "monitor_no2".

Set default names of Presets / Inputs / Outputs

Description: Renames **all** preset / input / output names to the default: Preset 1..32 / Input 1..16 / Output 1..16 respectively.

Info: *The <id> field is not relevant here, only has to be a valid one. The command will affect **ALL** Presets / Inputs / Outputs disregarding the actual number that was in the command.*

8.4.19. Reload default preset names

Format		Example
Command	{PNAME#<id>=!}	→ {pname#2=!}
Response	(PNAME#<id>= Preset<id>)CrLf	← (PNAME#2=Preset 2)CrLf

Info: *Preset names will be renamed to the factory defaults but will not refreshed in the Lightware Matrix Controller software. Please click on the **Read preset names** button to refresh all the preset names.*

8.4.20. Reload default input names

Format		Example
Command	{INAME#<id>=!}	→ {iname#4=!}
Response	(INAME#<id>= Input<id>)CrLf	← (INAME#4=Input 4)CrLf

Info: *Input names will be renamed to the factory defaults but will not refreshed in the Lightware Matrix Controller software. Please right click on one input name and choose the **Read I/O names** item to refresh all the input names.*

8.4.21. Reload default output names

Format		Example
Command	{ONAME#<id>=!}	→ {oname#3=!}
Response	(ONAME#<id>= Output<id>)CrLf	← (ONAME#3=Output 3)CrLf

Info: *Output names will be renamed to the factory defaults but will not refreshed in the Lightware Matrix Controller software. Please right click on one output name and choose the **Read I/O names** item to refresh all the output names.*

8.4.22. Reload factory default output setup

Description: Reload factory defaults.

Format		Example
Command	{r00}	→ {r00}
Response	(APWSE)CrLf	← (APWSE)CrLf

8.4.23. Query IP settings

Description: IP setup can be retrieved from the router with this command.

Format	Example
Command {IP_CONFIG=?} Response (IP_CONFIG=<id> ●<ip_address>●<port> ●<mask>●<gateway>)CrLf	→ {ip_config=?} ← (IP_CONFIG=0 192.168.2.106 10001 255.0.0.0 192.168.2.1)CrLf

Legend:

Identifier	Description	Default value
<id>	0-fix IP, 7-DHCP	0
<ip_address>	IP address	192.168.254.254
<port>	IP port of the router	10001
<mask>	subnet mask	255.255.0.0
<gateway>	gateway address	0.0.0.0

Explanation: The router has a fix 192.168.2.106 IP address on the 255.0.0.0 subnet with a gateway on 192.168.2.1 and communicates over port no. 10001.

Info *If the matrix responds only zeros for this command, please unplug from power source, reconnect and try again.*

8.4.24. Reload factory default IP settings

Description: After issuing this command over serial connection the router will reload the factory default IP setup.

Format	Example
Command {IP_CONFIG=!} Response (Changing●IP● configuration…)CrLf (DONE!)CrLf or (FAILED!)CrLf	→ {ip_config=!} ← (Changing IP configuration…)CrLf ← (DONE!)CrLf or (FAILED!)CrLf

Parameters after successful command execution:

Parameter	Value
IP address	192.168.254.254
port number	10001
Subnet mask	255.255.0.0
Gateway	0.0.0.0

Info *IP settings can NOT be changed with this protocol command via Ethernet connection, only via serial port. To change the IP settings via Ethernet, use the Matrix Controller software (section 5.6.1) or the built-in website (section 6.5). Default setting can be reloaded by the front panel buttons as well (section 4.3.5).*

8.4.25. Load DHCP IP settings (only IP address!)

Description: After issuing this command over serial connection the router will inquire IP address with DHCP.

Format	Example
Command {IP_CONFIG=D} Response (Changing●IP● configuration…)CrLf (DONE!)CrLf or (FAILED!)CrLf	→ {ip_config=D} ← (Changing IP configuration…)CrLf ← (DONE!)CrLf or (FAILED!)CrLf

Parameters after successful command execution:

Parameter	Value
IP address	Acquired with DHCP
port number	unchanged
Subnet mask	unchanged
Gateway	unchanged

Info *IP settings can NOT be changed with this protocol command via Ethernet connection, only via serial port. To change the IP settings via Ethernet, use the Matrix Controller software (section 5.6.1 on page 36) or the built-in website (section 6.5 on page 46). Default setting can be reloaded by the front panel buttons as well (section 4.3.5 on page 24).*

8.4.26. View LAN versions

Description: Shows information about the LAN interface.

Format	Example
Command {LAN_VER=?} Response (MAC_ADDR=<mac>)CrLf (WEB_VER=<ver1>)CrLf (SERVER_VER=<ver2>)CrLf	→ {lan_ver=?} ← (MAC_ADDR=00-20-4A-E3-1D-E42)CrLf ← (WEB_VER=1.4.0)CrLf ← (SERVER_VER=1.1.5)CrLf

Legend: <mac> stands for the active protocol.

<ver1> Version of built-in website user interface (webcontent).

<ver2> Version of LAN controller firmware (webserver).

Explanation: MAC address, webcontent and webserver versions are shown.

8.5. Port status commands

8.5.1. Input port status

Description: Shows the actual status of the input ports.

Format	**Example** (MX16x16DVI-Plus)
Command {:ISD} Response (ISD●<INPUT_D>)CrLf	→ {:isd} ← (ISD 1000000010010001 0000000000000000)CrLf

Explanation: Input 1, 9, 12 and 16 has a connected source.

Legend: <INPUT_D> always contains 32 decimal numbers but the first 16,12 or 9 are valid only. (It depends on the matrix size). Each number represents the state for the corresponding input port:

- 0: There is no connected source or does not send 5V
- 1: The connected source is connected and sends 5V

8.5.2. Output port status

Description: Shows the actual status of the output ports.

Format	Example (MX16x16DVI-Plus)
Command {:OSD} Response (OSD●<OUTPUT_D>)CrLf	→ {:osd} ← (OSD 1000000010010001 0000000000000000)CrLf

Explanation: There are four DVI sinks connected on ports 1,9,12 and 16. No other output port is connected.

Legend: <OUTPUT_D> always contains 32 decimal numbers but the first 16,12 or 9 are valid only. Each number represents the state for the corresponding output port.

- 0: There is no connected DVI sink or does not send Hotplug signal
- 1: Hotplug signal is presented by the connected device

8.6. Router Status commands

8.6.1. View product type

Description: The router responds its name.

Format	Example(MX16x16DVI-Plus)
Command {I} Response (<PRODUCT_TYPE>)CrLf	→ {i} ← (MX16x16DVI-Plus)CrLf

Legend:

<PRODUCT_TYPE>	inputs	outputs	interface
MX16x16DVI-Plus	16	16	single link
MX12x12DVI-Plus	12	12	single link
MX9x9DVI-Plus	9	9	single link

Explanation: The connected device is an MX16x16DVI-Plus.

8.6.2. View serial number

Description: The router responds its 8-digit serial number.

Format	Example
Command {S} Response (<SERIAL_NUMBER>)CrLf	→ {s} ← (SN:10170142)CrLf

Info *Only the last 4 numbers are written onto the back of the router*

8.6.3. View Firmware version of the CPU

Description: View the CPU firmware revision. To view other controller's firmware version see {FC} command (section *8.6.6* on page *60*).

Format	Example
Command {F} Response (<FW_VERSION>)CrLf	→ {f} ← (FW:2.4.8)CrLf

Legend: <FW_VERSION> is the firmware version.

8.6.4. View CPU firmware compile time

Description: Shows the CPU firmware compile time.

Format	Example
Command {CT} Response (Compiled:<DATE>●<TIME>● Build:<tag>)CrLf	→ {ct} ← (Compiled: Aug 29 2012 17:39:36, build: 1624)CrLf

Legend:

<DATE>	Month, Day and Year
<TIME>	Hours, minutes and seconds
<tag>	Identification number of the firmware

Explanation: The firmware was made in 29.08.2012, 17:39:36 and the identification number of the firmware is 1624.

8.6.5. View Installed I/O cards' hardware

Description: Shows the hardware name and revision of the installed cards.

Info *This router model is a compact type, so there are no separate input / output cards. Separate card slot descriptors are listed only because of compatibility issues.*

Format	**Example** (MX16x16DVI-Plus)
Command {IS} Response (SL#●0● <MB_DESC>)CrLf (SL#●1●<OB_DESC>)CrLf (SL#●2●<OB_DESC>)CrLf (SL#●3●<OB_DESC>)CrLf (SL#●4●<OB_DESC>)CrLf (SL#●5●<IB_DESC>)CrLf (SL#●6●<IB_DESC>)CrLf (SL#●7●<IB_DESC>)CrLf (SL#●8●<IB_DESC>)CrLf	→ {is} ← (SL# 0 MX16X16DVI-PLUS SCH_2.5 PCB_2.5)CrLf ← (SL# 1 MX16x16DVI-PLUS-OB SCH_2.5 PCB_2.5)CrLf ← (SL# 2 MX16x16DVI-PLUS-OB SCH_2.5 PCB_2.5)CrLf ← (SL# 3 Empty Slot)CrLf ← (SL# 4 Empty Slot)CrLf ← (SL# 5 MX16x16DVI-PLUS-IB SCH_2.5 PCB_2.5)CrLf ← (SL# 6 MX16x16DVI-PLUS-IB SCH_2.5 PCB_2.5)CrLf ← (SL# 7 Empty Slot)CrLf ← (SL# 4 Empty Slot)CrLf

Explanation (MX16x16DVI-Plus router): The router reports as if it has two output ad two input cards.

8.6.6. View installed controllers' firmware

Description: Shows the firmware revisions of the installed controllers.

Format	Example
Command {FC} Response (<CARD_FIRMWARE>)CrLf	→ {fc} ← (CF MX-CP FW:1.0.8 @ 0x10)CrLf ← (CF MX-DVI-EDID FW:3.2.3 @ 0x50)CrLf

8.6.7. View current control protocol

Description: Shows the RS-232, TCP/IP control protocol.

Format		Example
Command	{P_?}	→ {p_?}
Response	CURRENT●PROTOCOL●=●#<x>)CrLf	← (CURRENT PROTOCOL = #1)CrLf

Legend: <x> stands for the active protocol.

Explanation: Protocol 1 is active here.

8.6.8. Set current control protocol

Description: Sets the current RS-232, TCP/IP control protocol (Default is '1').

Format		Example
Command	{P_x}	→ {p_1}
Response	(PROTOCOL●#<x>●SELECTED!)CrLf	← (PROTOCOL #1 SELECTED!)CrLf

Legend: <x> stands for the selected protocol.

Explanation: Protocol 1 is activated.

8.6.9. View error list

Description: Shows the error list since last boot up.

Format		Example
Command	{ELIST=?}	→ {elist=?}
Response	(<class>,<e_desc>,<e_code>,<e_occ>)CrLf	← (0,BOOT,00,1) CrLf
	…	…
	(<class>,<e_desc>,<e_code>,<e_occ>)CrLf	← (0,BOOT,08,2) CrLf

Legend:
- <class>: class of the error
- <e_desc>: short description of the error
- <e_code>: short device address in HEX format
- <e_occ>: occurrence number for this type of log entry

Info: *The error list can contain NOTICEs and WARNINGs under normal operation. These entries do not mean that there is any problem with the matrix!*

8.6.10. View all error lists

Description: Shows all the error lists.

Format	Example
Command {ELIST=A} Response (<class>,<e_desc>,<e_code>, <e_occ>)CrLf … (<class>,<e_desc>,<e_code>, <e_occ>)CrLf	→ {elist=a} ← (0,BOOT,00,1) CrLf … ← *(0,BOOT,08,2)*CrLf

Legend:
<class>: class of the error
<e_desc>: short description of the error
<e_code>: short device address in HEX format
<e_occ>: occurrence number for this type of log entry

Info: *The error list can contain NOTICEs and WARNINGs under normal operation. These entries do not mean that there is any problem with the matrix!*

8.6.11. Clear error list

Description: Clear all the error lists.

Format	Example
Command {ELIST=!} Response (List●is●Empty!)CrLf	→ {elist=!} ← (List●is●Empty!)CrLf

Explanation: All error lists are cleared.

8.7. EDID router commands

The EDID router manipulates the EDID memory, which has memory locations that are assigned to specific input or output ports. Please see section 7 on page 49 about EDID memory structure.

8.7.1. Route EDID to the selected input (static)

Description: Copies EDID from location <loc> to input <in>. <loc> must be 1..100.

Format	Example
Command {<in>:<loc>} Response (E_SW_OK)CrLf …delay… (E_S_C) CrLf	→ {5:10} ← (E_SW_OK)CrLf …delay… ← (E_S_C) CrLf

Explanation: EDID from memory location 10 is copied to input 5.

Note: *The router sends (E_S_C) only if the new EDID is different from the earlier one.*

8.7.2. Route EDID to the selected input (dynamic)

Description: Copies EDID from location <loc> to input <in>. Location <loc> should be 101...116 (MX16x16DVI-Plus) or 101...112 (MX12x12DVI-Plus) or 101…109 (MX9x9DVI-Plus) as opposed to static routing where <loc> should be between 1..100.

Format		Example
Command	{<in>:<loc>}	→ {4:102}
Response	(E_SW_OK)CrLf …delay… (E_S_C) CrLf	← (E_SW_OK)CrLf …delay… ← (E_S_C) CrLf

Info *Outputs 1..16 are mapped to logical addresses 101..116.*

Explanation: EDID from output 2 is copied to input 4.

After choosing dynamic EDID routing to one (or all inputs) the router will follow the EDID changes occurring on the output it was connected to. Every time a different EDID is recognized on the output, it is copied instantly to the input.

8.7.3. Route one EDID to all inputs

Description: Copies EDID from the selected location <loc> to all inputs. Location <loc> should be between 1..100 for static routing and between 101..116 for dynamic routing.

Format		Example
Command	{A:<loc>}	→ {a:48}
Response	(E_SW_OK)CrLf …delay… (E_S_C) CrLf	← (E_SW_OK)CrLf …delay… ← (E_S_C) CrLf

Explanation: EDID from memory location 48 is copied to all inputs.

Info *This operation takes about 10 seconds.*

8.7.4. View EDID switch status on all inputs

Description: Indexes show the actual input and the number at the given index (<in1>..<inN>) shows which EDID is switched to that particular input where N represents the maximal input number of the given configuration.

Format		**Example 1** (MX16x16DVI-Plus)
Command	{VEDID}	→ {vedid}
Response	(VEDID●<IN1>●<IN2>● <IN3>●<IN4>●<IN5>● <IN6>●<IN7> ●<IN8>● <IN9>●<IN10>●<IN11>● <IN12>●<IN13>●<IN14>● <IN15>●<IN16>)CrLf	← (VEDID 048 048 053 101 101 101 101 101 101 101 101 101 101 101 101 101)CrLf

Legend: Any <INx> indexes are **three digit** numbers showing the current EDID that is routed to the corresponding input. Respond length depends on input number of the router.

Explanation: Factory preset EDID from memory location 48 is emulated on inputs 1 and 2. User saved EDID from memory location 53 is emulated on input 3. EDID from output 1 is dynamically emulated on all other inputs.

8.7.5. Save EDID from output to memory location (Learn EDID)

Description: Learn EDID from the specified output <out> to the specified location <loc>. Memory locations 51..100 are available for saving learned EDIDs.

Format		Example
Command	{<out>><loc>}	→ {4>51}
Response	(E_SW_OK)CrLf (E_S_C) CrLf	← (E_SW_OK)CrLf ← (E_S_C) CrLf

Explanation: EDID from output 4 is saved to EDID memory location 51.

8.7.6. View EDID validity table

Description: Shows EDID validity table, which contains information about the EDID states.

Format		**Example** (MX16x16DVI-Plus)
Command	{WV}	→ {wv}
Response	(EV●<VALIDITY_TABLE>)CrLf	← (EV **11111111111111111111111111** ← **11111111111111111111111111**111 00000000000000000000000000 00000000000000000010*11111111* *11111110000000000000000**11113*** ***11111111110000000000000000**)CrLf

Legend: Response length is 164 characters. Each number represents the EDID validity state for the corresponding memory location. The first 50 numbers (bold) are representing the factory preset EDIDs, the second 50 numbers are representing the User saved EDIDs. From the next 32 numbers the first 16* (italic) are showing the outputs' EDID state, and from the last 32 numbers the first 16* (bold and italic) are showing the emulated EDIDs on the inputs.

* The number depends on the matrix size. (16, 12 or 9)

Value	Description
'0'	invalid EDID
'1'	valid EDID
'3'	changed EDID

If a changed EDID is queried by the {wh} command (see the next section), its value returns to '1'.

Explanation: There is one '3' in the table on the 137th position. This means that the emulated EDID on input 5 is changed since the last EDID query on that port.

8.7.7. View EDID header

Description: EDID_HEADER consists of 3 fields:

PNPID code The three letter abbreviation of the manufacturer

Preferred resolution The resolution and refresh rate stored in the preferred detailed timing block.

Name The name of display device stored in product descriptor.

Format		Example
Command	{WH<loc>}	→ {wh104}
Response	(EH#<loc>● <EDID_HEADER>)CrLf	← (EH#104 NEC 1280x1024@60 LCD1970NXp)

Explanation: Shows the EDID from memory location 104.

8.7.8. Download EDID content from the router

Description: EDID hex bytes can be read directly. The router will issue the whole content of the EDID present on memory location <loc> (256 bytes).

Format	Example
Command {WE<loc>}	→ {we1>}
Response (EB#<loc>●<B1> ●<B2>●..●<B256>)CrLf	← (*EB#1 00 FF FF FF FF FF FF 00 32 F2 00 00 00 .. .. .. 00 92*) CrLf

Legend: <B1>..<B256> are space separated hex characters represented in ASCII format.

Explanation: Full EDID from memory location 1 is downloaded.

8.7.9. Upload EDID content to the router

Description: EDID hex bytes can be written directly to the user programmable memory locations (locations #51...#100).

Sequence:

Step 1. Prepare the router to accept EDID bytes to the specified location <loc> with command *{WL#<loc>}*

Step 2. Router responds that it is ready to accept EDID bytes with *(E_L_S)CrLf*

Step 3. Send 1 block of EDID (1 block consist of 8 bytes of hex data represented in ASCII format) with command *{WB#<num>●<B1>●<B2>●<B3>●<B4>●<B5>●<B6>●<B7>●<B8>}*

Step 4. The router acknowledges with response *(EL#<num>)*

Step 5. Repeat steps 3 and 4 to send the remaining 31 blocks of EDID (32 altogether)

Step 6. After the last acknowledge, the router indicates that the EDID status changed by sending *(E_S_C) CrLf*

Format	Example
Command {WL#<loc>}	→ {WL#53}
Response (E_L_S)CrLf	← (E_L_S) CrLf
Command {WB#1●<B1>●<B2>●<B3> ●<B4>●<B5>●<B6>●<B7> ●<B8>}	→ {WB#1 00 FF FF FF FF FF FF 00}
Response (EL#<num>)CrLf	← (EL#1) CrLf
Command {WB#2●<B9>●<B10> ●<B11>●<B12>●<B13> ●<B14>●<B15>●<B16>}	→ {WB#2 38 A3 8E 66 01 01 01 01}
Response (EL#<num>) CrLf	← (EL#2) CrLf
⋮	⋮
Command {WB#32●<B249>●<B250> ●<B251>●<B252>●<B253> ●<B254>●<B255>●<B256>}	→ {WB#32 36 59 42 0A 20 20 00 96}
Response (EL#<num>) CrLf	← (EL#32) CrLf
Response (E_S_C) CrLf	← (E_S_C) CrLf

Legend: <num> represents the sequential number of every 8 byte part of EDID. <num> is between 1 and 32. <B1>..<B256> are the bytes of EDID.

Explanation: Full EDID uploaded to memory location 53.

8.7.10. Delete all EDID from memory

Description: Clear all User, Emulated and Last attached Monitor's EDIDs.

Format	Example
Command {:CLREDID} Response (E_S_C)CrLf	→ {:clredid} ← (E_S_C)CrLf

Explanation: All EDIDs are cleared expecting the factory ones.

8.8. Router initiated commands

8.8.1. Restart CPU controller

Description: The CPU controller can be restarted without unplugging power.

Format	**Example** (MX16x16DVI-Plus)
Command {RST} Response (CPU_RESET…)CrLf (<name>●Ready!)CrLf	→ {rst} ← (CPU_RESET…)CrLf ← (MX16x16DVI-Plus Ready!)

Legend: *<name>* is the type of the matrix

Explanation: The matrix reboots and sends a message when it is ready.

Info: *The response can be seen only if the connection to the router is still alive.*

8.8.2. Restart EDID controller

Description: The EDID controller can be restarted without unplugging power.

Format	**Example** (MX16x16DVI-Plus)
Command {:RST}	→ {:rst}
Response (Booting…)CrLf	← (Booting...)CrLf
(BOOT●SLOT●1●STARTED)CrLf	← (BOOT SLOT 1 STARTED)
(SL#●1●<OB_DESC>)CrLf	← (SL# 1 MX16X16DVI-PLUS-OB SCH_2.5 PCB_2.5)
(SL#●1●<OB_DESC>)CrLf	← (SL# 1 MX16X16DVI-PLUS-OB SCH_2.5 PCB_2.5)
(BOOT●SLOT●1●FINISHED)CrLf	← (BOOT SLOT 1 FINISHED)
…	… …
(BOOT●SLOT●8●STARTED)CrLf	← (BOOT SLOT 8 STARTED)
(BOOT●SLOT●8●FINISHED)CrLf	← (BOOT SLOT 8 FINISHED)

Explanation (MX16x16DVI-Plus router): The router reports as if it restarted all output and input cards.

Info: *The response can be seen only if the connection to the router is still alive.*

8.8.3. EDID status changed

Description: This is sent after all commands which changes the EDID (EDID copy, EDID switch), or after a new EDID source e.g. a new display device is connected to the router.

Format	Example
Command *various* Response (E_S_C) CrLf	→ {5:101} ← (E_SW_OK)CrLf ← (E_S_C) CrLf

Explanation: Copy EDID from output 1 to input 5 (dynamic emulation). First response confirms the EDID routing command. (E_S_C) response is an automatic message that is sent because an EDID has changed.

Info *The router stores the last attached display device's EDID connected to the output. After disconnecting this device its EDID is still present at the router's memory, therefore no status change message is issued by the router if a display device having the same EDID is connected to that output. (The same display device is connected again, or another display device (same brand) from the same manufacturer)*

Info *To keep your application in sync with the router it is recommended to issue a show validity ({wv}) command after receiving an EDID status changed response, and read all location indicating '3' in the table, as the change of these EDID triggered the EDID status changed response.*

8.8.4. Error responses

Invalid input number

Description: Given input number exceeds the maximum number of inputs or equals zero.

Response (ERR01)CrLf

Invalid output number

Description: Given output number exceeds the installed number of outputs or equals zero.

Response (ERR02)CrLf

Invalid value

Description: Given value exceeds the maximum allowed value can be sent.

Response (ERR03)CrLf

Invalid preset number

Description: Given preset number exceeds the maximum allowed preset number.

Response (ERR04)CrLf

Info *The maximum preset number is limited to 32 for all routers.*

9. Commands – Quick summary

Switching and control commands

Command description	See in chapter	Command
Switch one input to one output	8.4.1	{<in>@<out>}
Switch one input to all outputs	8.4.2	{<in>@O}
View connection on the specified output	8.4.3	{?<out>}
View connection on all outputs	8.4.4	{VC}
View mutes on all outputs	8.4.5	{VM}
Mute specified output	8.4.6	{#<out>}
Unmute specified output	8.4.7	{+<out>}
Lock specified output	8.4.8	{#><out>}
Unlock specified output	8.4.9	{+<<out>}
Save preset to the specified memory location	8.4.10	{$<id>}
Load preset from the specified location	8.4.11	{%<id>}
Preview preset	8.4.12	{VP#<id>=?}
Rename a preset	8.4.13	{PNAME#<id>=<preset_name>}
Rename an input	8.4.14	{INAME#<id>=<input_name>}
Rename an output	8.4.15	{ONAME#<id>=<output_name>}
Read a preset's name	8.4.16	{PNAME#<id>=?}
Read an input's name	8.4.17	{INAME#<id>=?}
Read an output's name	8.4.18	{ONAME#<id>=?}
Reload default preset names	8.4.19	{PNAME#<id>=!}
Reload default input names	8.4.20	{INAME#<id>=!}
Reload default output names	8.4.21	{ONAME#<id>=!}
Reload factory default output setup	8.4.22	{r00}
Query IP settings	8.4.23	{IP_CONFIG=?}
Reload factory default IP settings	8.4.24	{IP_CONFIG=!}
Load DHCP IP settings (only IP address!)	8.4.25	{IP_CONFIG=D}
View LAN versions	8.4.26	{LAN_VER=?}

Port status commands

Command description	See in chapter	Command
Input port status	8.5.1	{:ISD}
Output port status	8.5.2	{:OSD}

Router Status commands

Command description	See in chapter	Command
View product type	*8.6.1*	{I}
View serial number	*8.6.2*	{S}
View Firmware version of the CPU	*8.6.3*	{F}
View CPU firmware compile time	*8.6.4*	{CT}
View Installed I/O cards' hardware	*8.6.5*	{IS}
View installed controllers' firmware	*8.6.6*	{FC}
View current control protocol	*8.6.7*	{P_?}
Set current control protocol	*8.6.8*	{P_x}
View error list	*8.6.9*	{ELIST=?}
View all error lists	*8.6.10*	{ELIST=A}
Clear error list	*8.6.11*	{ELIST=!}

EDID router commands

Command description	See in chapter	Command
Route EDID to the selected input (static)	*8.7.1*	{<in>:<loc>}
Route EDID to the selected input (dynamic)	*8.7.2*	{<in>:<loc>}
Route one EDID to all inputs	*8.7.3*	{A:<loc>}
View EDID switch status on all inputs	*8.7.4*	{VEDID}
Save EDID from output to memory location (Learn EDID)	*8.7.5*	{<out>><loc>}
View EDID validity table	*8.7.6*	{WV}
View EDID header	*8.7.7*	{WH<loc>}
Download EDID content from the router	*8.7.8*	{WE<loc>}
Upload EDID content to the router	*8.7.9*	{WL#<loc>}
Delete all EDID from memory	*8.7.10*	{:CLREDID}

Router initiated commands

Command description	See in chapter	Command
Restart CPU controller	*8.8.1*	{RST}
Restart EDID controller	*8.8.2*	{:RST}

10. Firmware upgrade

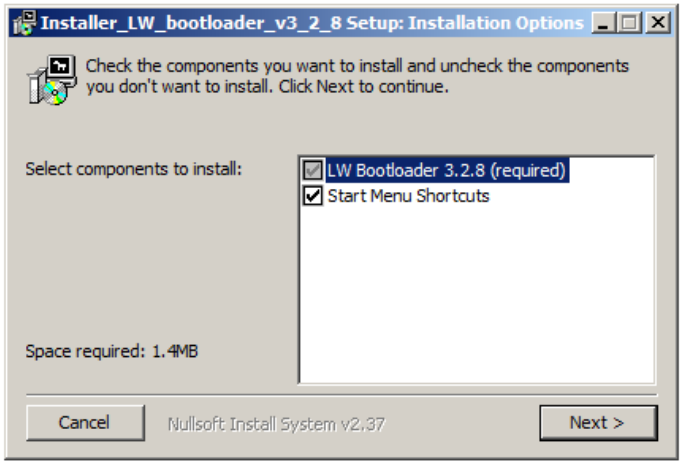
This chapter is meant to help customers perform firmware upgrades on our products by giving a few tips on how to start and by explaining the features of the Bootloader software.

10.1. Installing the Bootloader

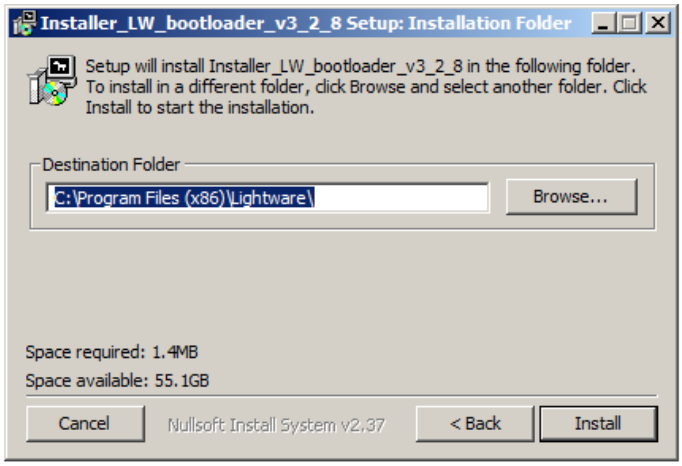
The matrix router can be upgraded using Lightware Bootloader from a Windows based PC or Laptop via Ethernet.

10.1.1. Installing and launching the Bootloader software

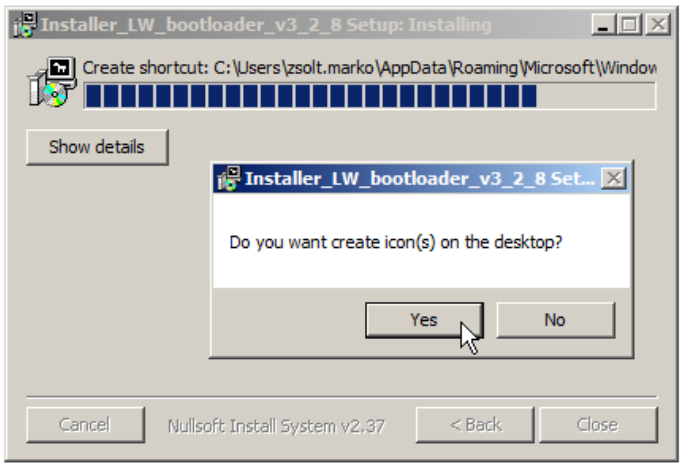
Step 1. Run Installer_LW_bootloader_v3_2_8.exe (3_2_8 means the 3-digit firmware version of the Bootloader)



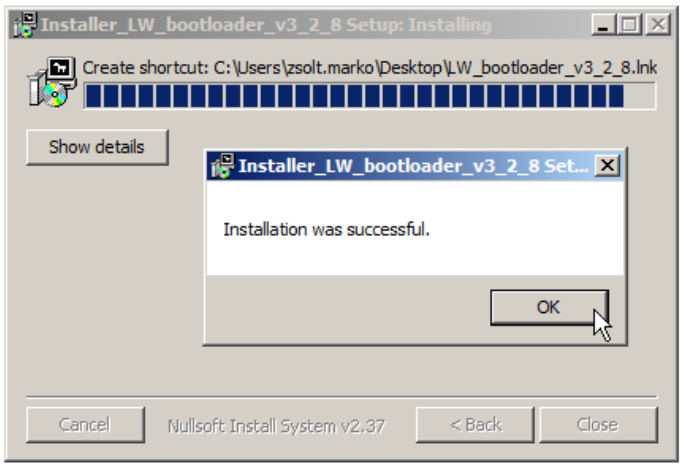
Step 2. Select destination folder and select Install (Using the default path is highly recommended)



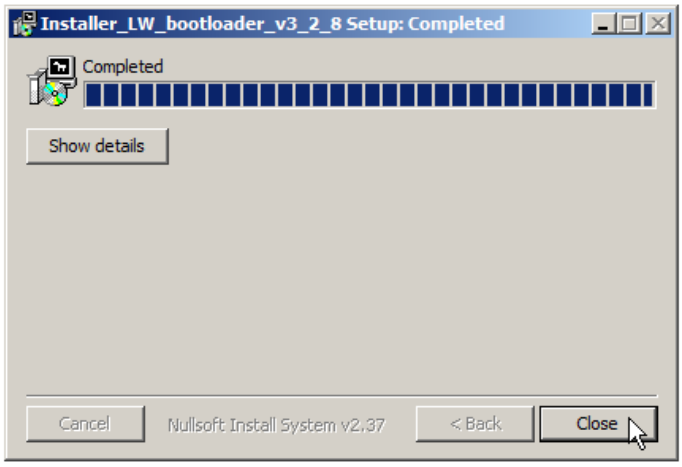
Step 3. If you want to create desktop icon select Yes in the next pop-up window:



Step 4. After the files have been copied, the following message appears:



Step 5. To finish the installation process, click on the Close button.



Step 6. To run Lightware Bootloader, find the shortcut icon in Start menu → Programs → Lightware → LW_bootloader_v3_2_8 or on the desktop, and double click on it.

Uninstalling

To uninstall the Bootloader software, double click on: Start menu → Programs → Lightware → Uninstall_LW_bootloader_v3_2_8.exe

10.2. Upgrade process

10.2.1. Tips for the upgrade process

Cross UTP connection

To avoid packet loss caused by an overloaded network, it is recommended to use cross UTP connection directly from the upgrading PC to the Lightware device.

Disable other Ethernet devices

The Bootloader software always queries the PC's primary Ethernet adapter (which is usually the adapter that is connected to the Internet) for available Lightware devices. It is recommended to disable every other Ethernet device (secondary LAN, Wi-Fi, 3G modem) for the time of the upgrade. If the Bootloader cannot find the Lightware device because the device is connected to the secondary Ethernet adapter (cross UTP connection), you need to disable the primary adapter (Internet). This way the Ethernet adapter which is connected to the Lightware device will become the primary adapter and the Bootloader can query it for Lightware devices. If you disable an Ethernet adapter while the Bootloader is running, you need to restart the Bootloader to be able to query the Ethernet adapter again.

A second option in this case is that if you know the IP address and port number of the Lightware device, you may use the Add IP button which is described in section *10.2.2* on page *72*.

Remove I/O connections

It is recommended to remove all video input and output connections from the Lightware device. Video sources and display devices may try to communicate with the Lightware device or send noise through the cable which may interfere with the upgrade process.

Latest Bootloader

Always perform the firmware upgrade with the latest Bootloader software. To get the latest Bootloader software, contact your local sales representatives or Lightware's support team at *support@lightware.eu*

Finishing the process with older versions of the Bootloader

Bootloader versions that are older than v3.1.8 do not close the connection with the Lightware device automatically upon finishing the upgrade process. With these versions, if you remove the UTP cable or restart the Lightware device before you properly exit the Bootloader, the Lightware device will stay in a so called 'bootload mode' and will not return to normal operating mode. In such cases connect to the Lightware device with the Bootloader again and exit from it properly.

Restart the device

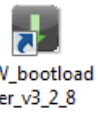
After a successful firmware upgrade, the device will restart itself but it is recommended to power down and up the device after finishing the upgrade.

10.2.2. Firmware upgrade

Step 1. Connect the Lightware device and the computer via Ethernet (hub, switch, router) or Ethernet directly (with cross UTP cable).

If you are connecting via **hub, switch or router**, then you can either set the Lightware device to have a fix IP (in which case make sure that there is no IP conflict on the network) or you can set the Lightware device to DHCP mode (in which case the Lightware device will acquire an IP address automatically). In this case the network must have a DHCP server. These settings can be done from the front panel LCD menu or via the supplied Lightware Matrix Controller software. If you are connecting directly, via a cross UTP cable, you need to set up a fix IP and subnet mask on the Lightware device and the PC.

Step 2. Start the application



To run the Bootloader software, double click on the icon of the software on the desktop or select proper shortcut from Start Menu → Programs → Lightware folder.

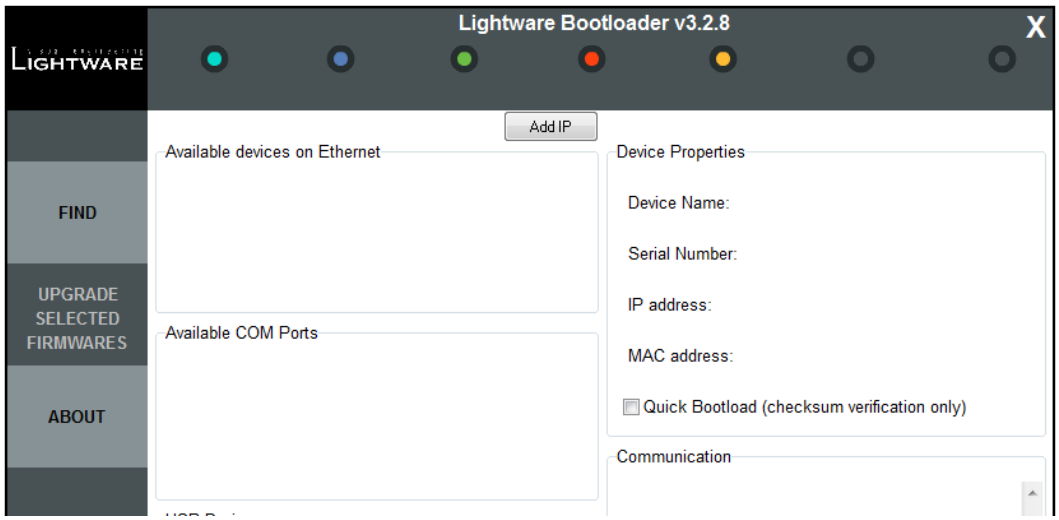


Figure 10-1. Bootloader software startup

Step 3. Find devices

Make sure that no active connection is made to the device (Lightware Matrix Controller software or web browser connected to the built-in website). Then click on the **FIND** button to query the Ethernet for Lightware devices.

Info: *COM ports do not list any information about the connected devices, users must know which COM port is connected to the Lightware device.*

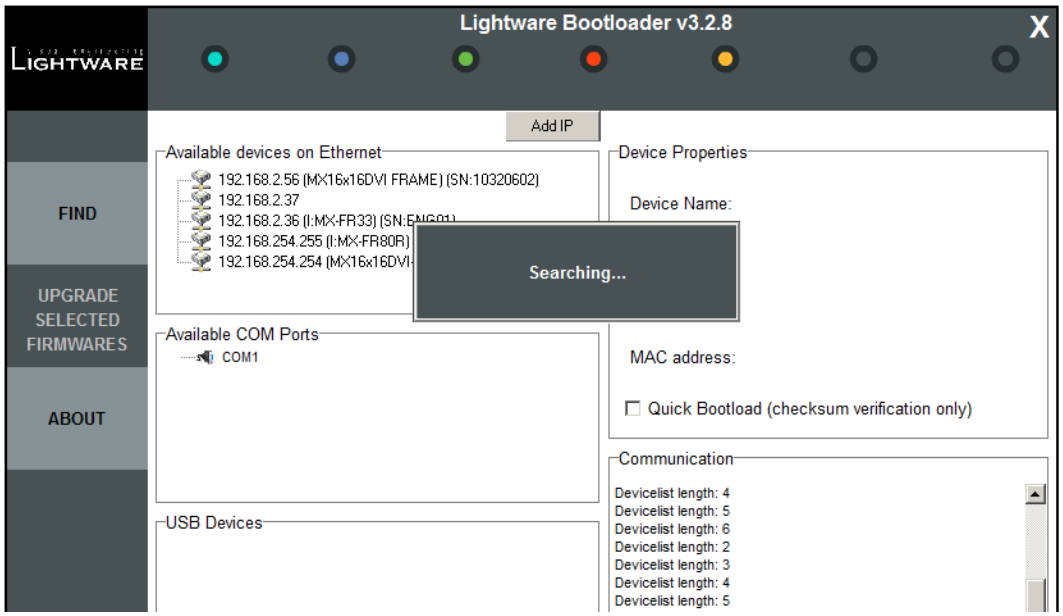


Figure 10-2. Searching for devices

The Bootloader software always queries the PC's primary Ethernet adapter (which is usually the adapter that is connected to the Internet) for available Lightware devices. It is recommended to disable every other Ethernet device (secondary LAN, Wi-Fi, 3G modem) for the time of the upgrade. If the Bootloader cannot find the Lightware device because the device is connected to the secondary Ethernet adapter (cross UTP connection), you need to disable the primary adapter (Internet). This way the Ethernet adapter which is

connected to the Lightware device will become the primary adapter and the Bootloader can query it for Lightware devices. If you disable an Ethernet adapter while the Bootloader is running, you need to restart the Bootloader to be able to query the Ethernet adapter again.

A second option in this case is that if you know the IP address and port number of the Lightware device, you may use the Add IP button above the Available Devices on Ethernet window.

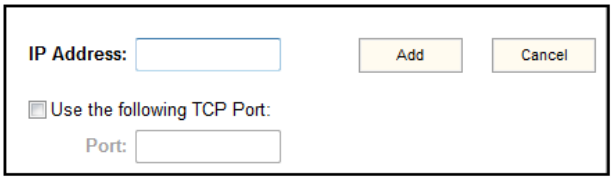


Figure 10-3. Add IP

If the Lightware device is connected to the secondary Ethernet adapter (or for any other reason) and the Bootloader doesn't list it in the available devices window, you can manually add its IP address and TCP Port number. This way the device name and IP address won't be displayed, but double clicking on the IP address will establish the connection.

Step 4. Connect to a device

If the Bootloader finds one or more Lightware devices then they will be listed in the tree view window. This window shows the device type, IP address and serial number of the found Lightware devices. COM ports do not query these information, users must know which COM port is connected to the Lightware device. Double click on one of the available devices. The Bootloader will ask if you really want to connect to the device. Select **YES** to establish the connection. It will take 10-15 seconds to get all the information from the Lightware device. After establishing the connection the device enters bootload mode and suspends normal operation.

Warning *The bootloader application will hold the router in reset state when it establishes the connection. All connected DVI sources and monitors will act as if the router was powered down.*

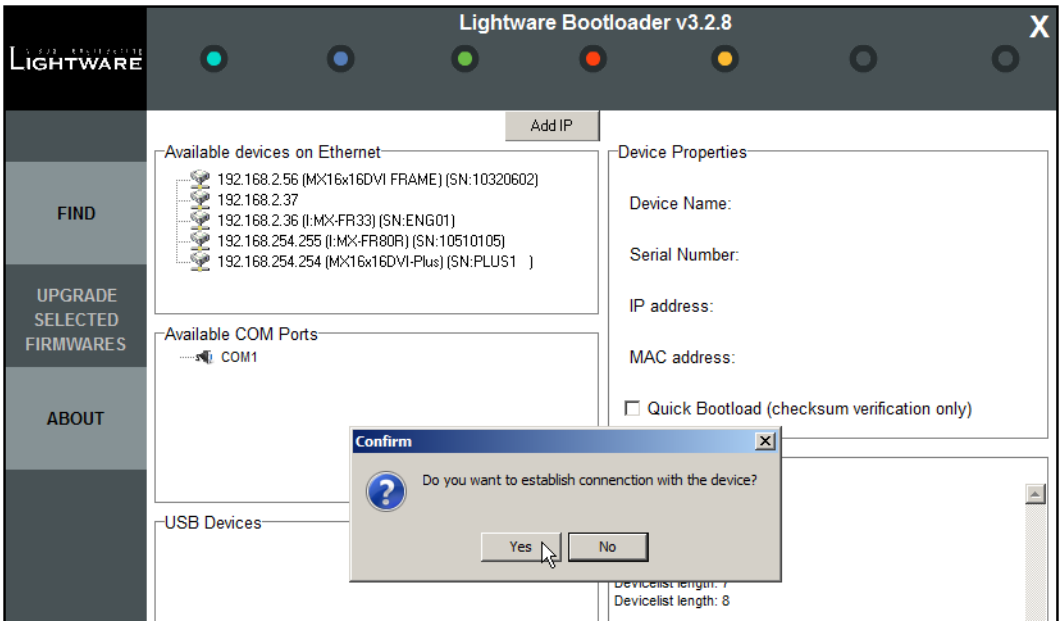


Figure 10-4. Establishing connection

Step 5. Requesting device information

After clicking on the YES button, the device name, serial number, IP address, MAC Address and current firmware versions are displayed.

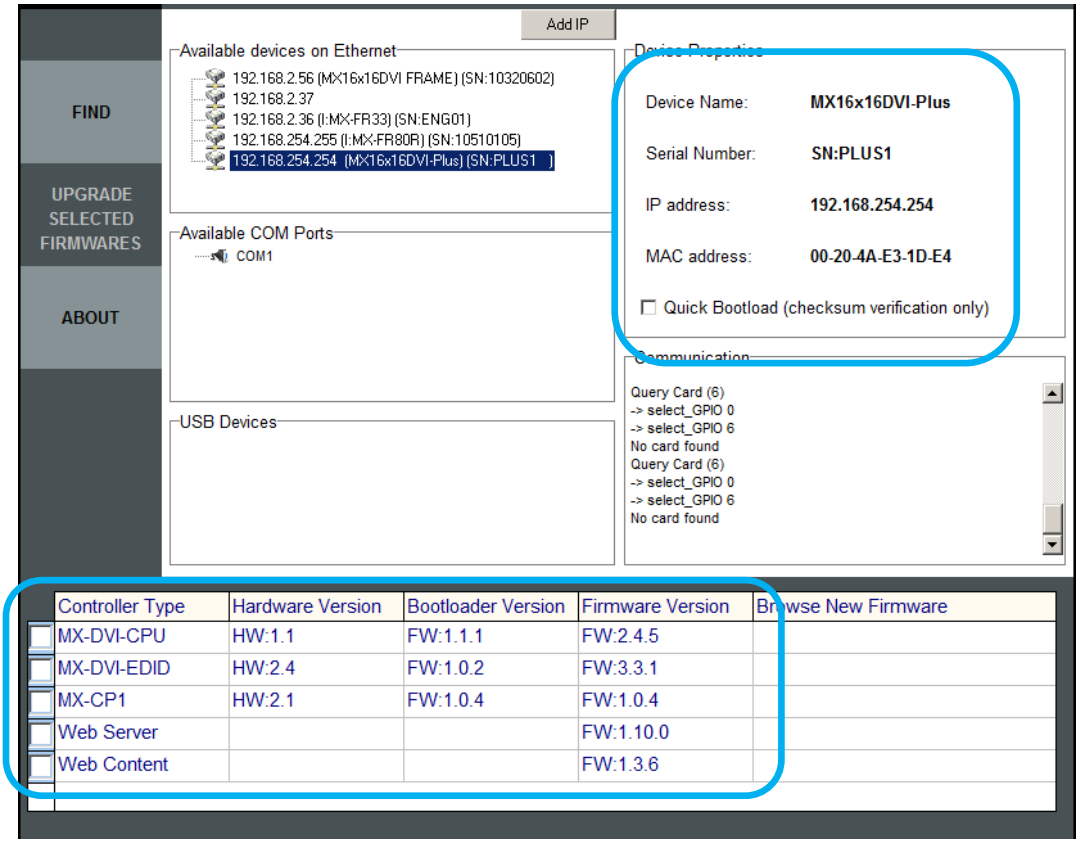


Figure 10-5. Details of the device

Step 6. Select firmwares to upgrade

To upgrade a firmware, click in the field in the line of the controller (marked with pink in the picture below). Click on **YES** in the pop-up window to modify the path to the new firmware file. Controller types are described in the table below. Now you can browse for the new firmware file to upload. After opening the new file, the new firmware field will contain the name of the firmware file.

Controller name	Description
MX-DVI-CPU	The main processor in the matrix.
MX-DVI-EDID	The EDID management handling processor
MX-CP1	Front side control panel for the matrix.
Web Server	The controller that handles Ethernet communication in devices with Ethernet port.
Web Content	The controller that handles the built-in website in devices with Ethernet port.

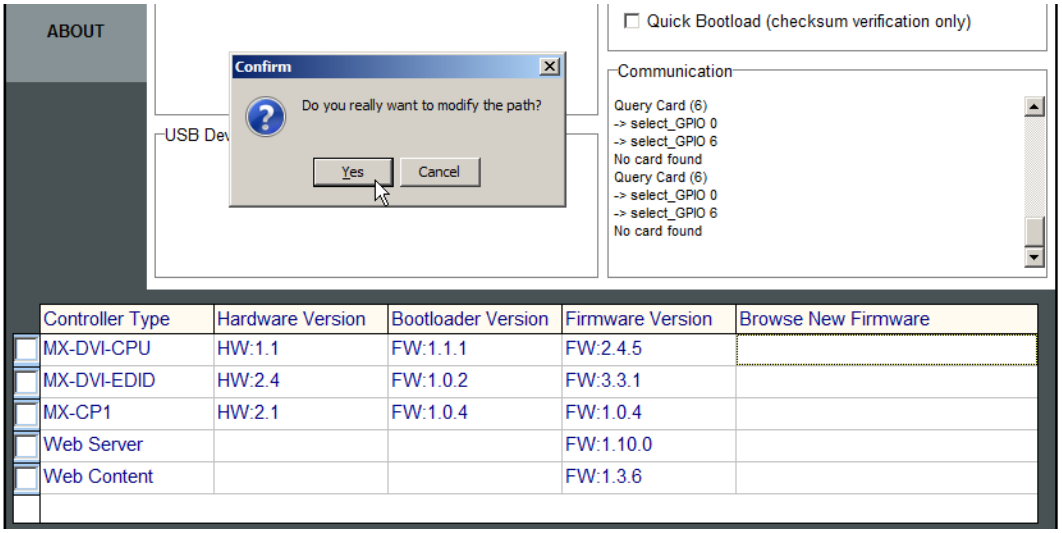


Figure 10-6. Selecting new firmware files

Step 7. Enable the upgrade and Quick Bootload mode

After selecting the new firmware file, you must enable the upgrade by clicking the checkbox left to the controller type (marked with a red rectangle in the picture below). You may enable Quick Bootload mode by clicking the checkbox next to it (marked with a blue rectangle in the picture below). Quick Bootload mode speeds up the process by not reading back the written data, only verifying the checksum. It can be enabled and disabled any time during the upgrade process.

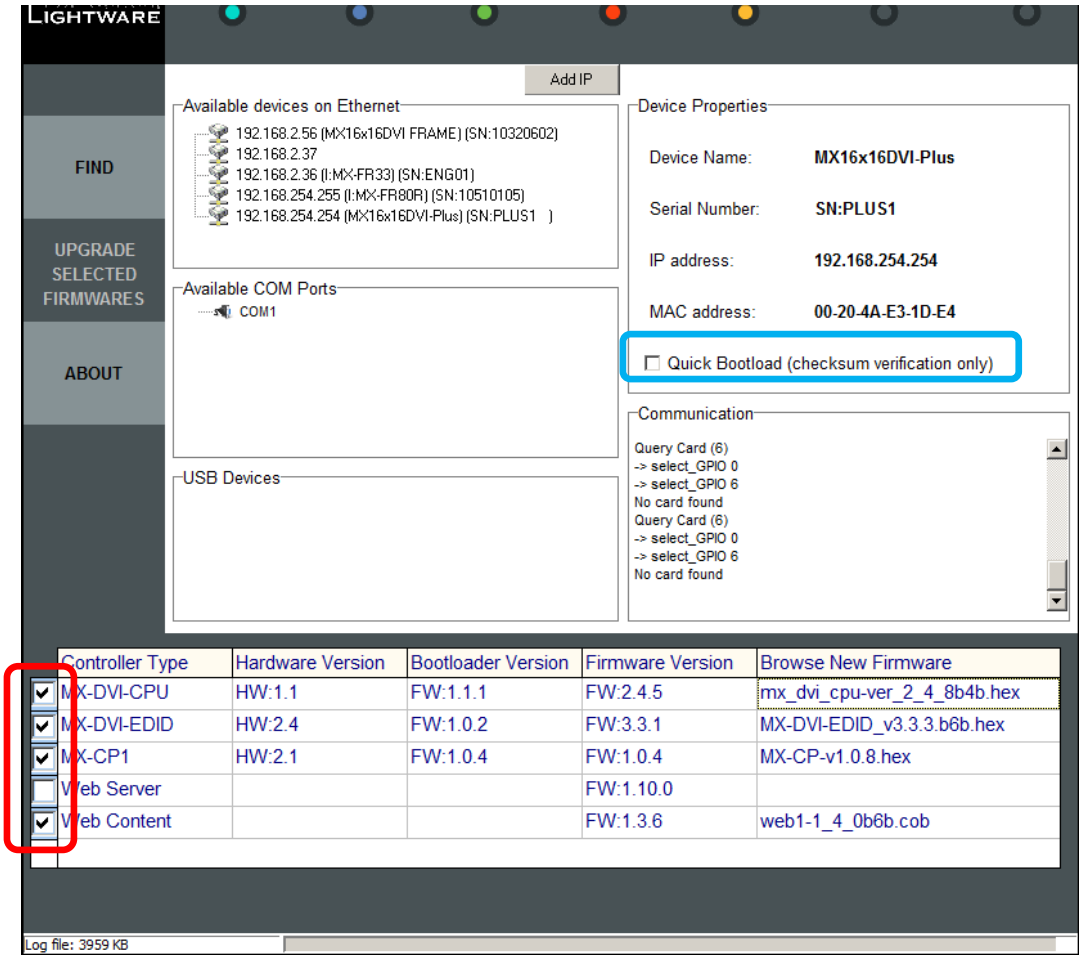


Figure 10-7. Enabling the upgrade and Quick Bootload mode

Step 8. Starting the upgrade process

After selecting all the firmwares that need to be upgraded, click on the **UPGRADE SELECTED FIRMWARES** button. Then click on **YES** in the appearing window to start the process.

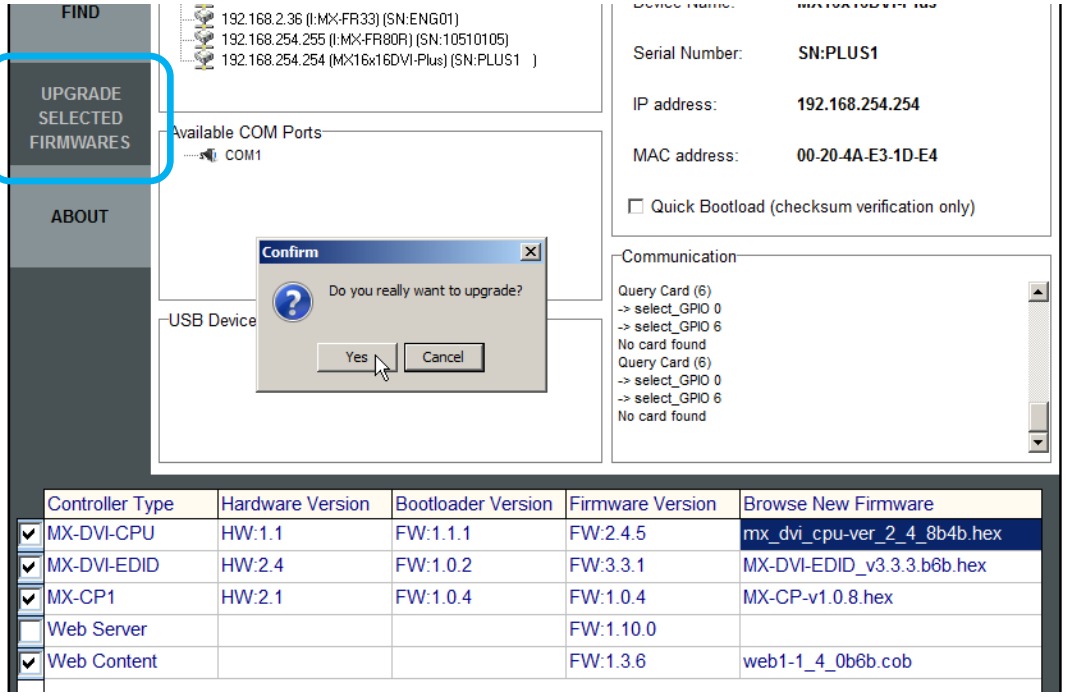


Figure 10-8. Starting the upgrade process

Step 9. Upgrading

The Bootloader will first erase the content of the controllers and then write the new firmware data. This process can be monitored in the communication window and the progress bar (both are marked with blue rectangles in the picture below).

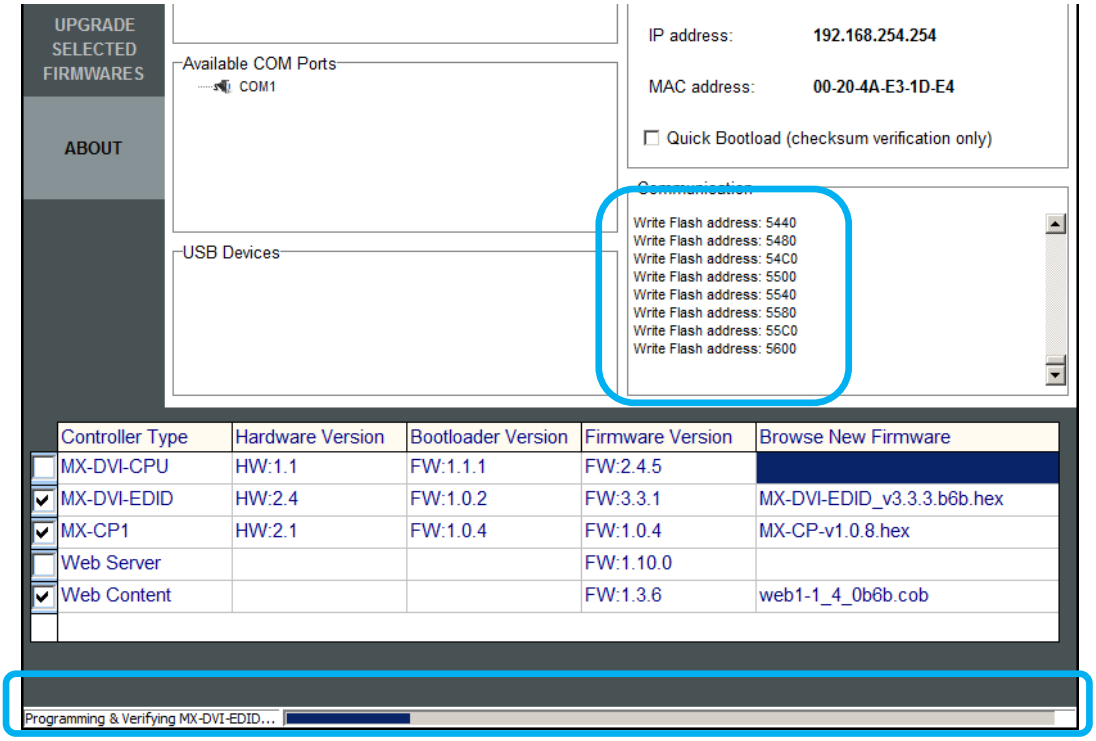


Figure 10-9. Upgrading

Step 10. Closing connections

After all controllers are upgraded, the Bootloader will close the connection with the Lightware device, which will reboot itself and return to its normal operating mode.

Warning *Bootloader versions that are older than v3.1.8 will not close the connection and restore the Lightware device until you exit the Bootloader.*

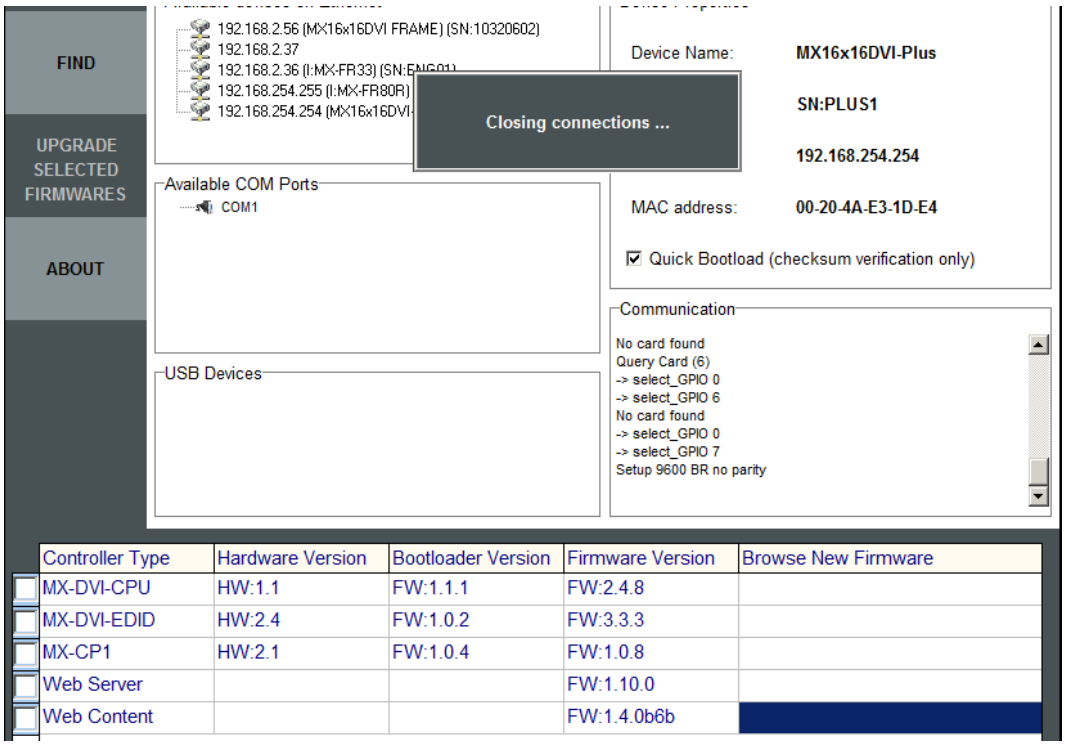


Figure 10-10. Closing connections

Step 11. Upgrade successful

If the connections are closed and no errors occurred, the firmware upgrade is SUCCESSFUL. Click on the **OK** button and then you may exit the Bootloader or connect to another Lightware device to perform firmware upgrades.

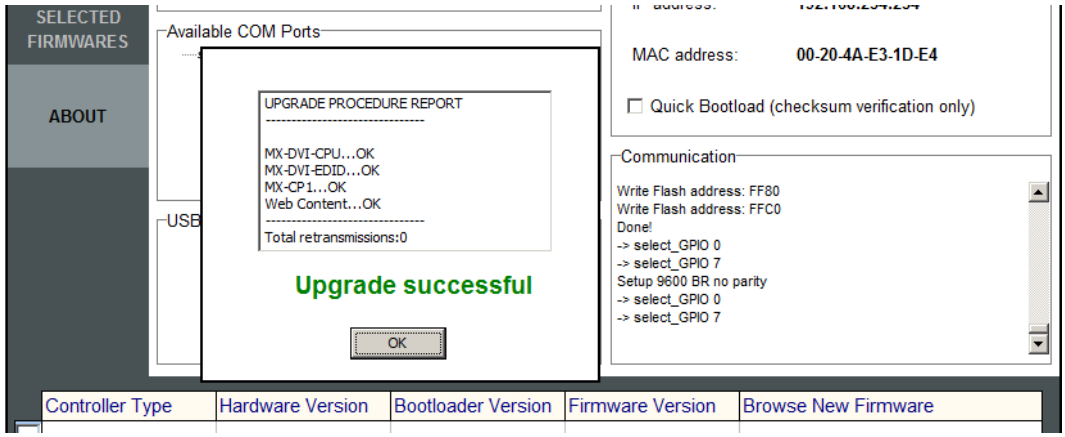


Figure 10-11. Upgrade successful

Step 12. Restart the device

The Lightware device will restart itself automatically, but it is recommended to completely power down and power up the device after exiting the Bootloader.

11. Troubleshooting

11.1. General problems

Check the router

Check whether the router is properly powered and whether CPU LIVE LED is blinking. Try performing a reset through the controller software, or unplug and reconnect the router's power cable.

11.2. Serial connection problems

Check the protocol

Check whether the proper protocol is selected (see sections *4.3.6* and *8.6.7, 8.6.8* on pages *25* and *61* about changing and viewing protocols). Select Protocol #1 in order to use the matrix with the controller software.

Check the cable and software settings

Check whether your mail to female straight serial cable is properly connected. In most cases there are more COM ports present in the operating system. Please verify the connection settings of your software. The router communicates with **9600** Baud, **8** data bit, **N**o parity, **1** stop bit.

11.3. TCP/IP connection problems

Check the LAN cable type

If you connect the router directly to your computer, you must use a cross-link cable. If the matrix is connected to an Ethernet hub, switch or router, you have to use a straight patch LAN cable.

Check the network connection

The computer and the router have to be in the same network. If your computer has multiple network connections (for example WiFi and LAN connections are used simultaneously), check which network the router is connected to. The appropriate Ethernet interface has to be selected in the Find dialog box of the Matrix Controller software (see section *5.2* on page *27*).

Check the IP settings

If you connect the router directly to your computer, you have to set the router's IP address manually, since in this case there is no DHCP server that could assign an address to the matrix.

If the IP address is set manually, check if there is an IP address conflict. If there is a DHCP server on the network, try to set the matrix to DHCP mode. See section *4.3.5* about how to reset the IP address with the front panel buttons on page *24*.

Check whether your computer's firewall blocks the selected port.

Check the protocol

Check whether the proper protocol is selected (see sections *4.3.6* and *8.6.7, 8.6.8* on pages *25* and *61* about changing and viewing protocols). Select Protocol #1 in order to use the matrix with the controller software.

Check the proxy settings

If the connection between the matrix and the computer cannot be created and a proxy server is used in your network please turn off the proxy or add the local network addresses to the proxy exceptions.

Check alive connections

Only one connection is allowed simultaneously. Check whether there is another open connection (e.g. opened router web interface, running control software over Ethernet). Try restarting the router if you have no other option.

11.4. Picture is not displayed or distorted

Check the cables (DVI)

Due to the high data rates, the cables must fit very well. DVI connectors have to be locked with screws, no tensions or breaches are allowed. If your source or display has more connectors then make sure that the proper interface is selected.

Although the router is equipped with DVI-I connectors, analog signals are not supported. You cannot use VGA cables with DVI-VGA adapter plugs.

Check the cables (TP)

Due to the high data rates, high quality cables must be used. It is recommended to use Cat6 or Cat7 S/FTP cables.

Check the crosspoint matrix

Check the connection between the input and output port either on the front panel or from web or the control software. Check whether the output is muted or not.

Check EDID related problems

Maybe your display device is not capable of receiving the sent video format. Try emulating your display device's EDID to the source. You will find help on this process in section *5.4.1* about EDID router operation with control software on page *32*, or in section *6.3* about EDID router operation with built-in website on page *42*. If you get a picture now, you have an EDID related issue, please read section *2.4* about understanding EDID on page *10* for more details.

Check the source

Check whether your source is powered on and configured properly. The HDMI output can be turned off on most DVD players. If the source is a computer, then verify that the DVI output is selected and active. Try restarting your computer; if you get a picture during the booting process, you have to review the driver settings.

11.5. Bootload

The Bootloader cannot find the matrix

The Bootloader software always queries the PC's primary Ethernet adapter (which is usually the adapter that is connected to the Internet) for available Lightware devices. It is recommended to disable every other Ethernet device (secondary LAN, Wi-Fi, 3G modem) for the time of the upgrade. If the Bootloader cannot find the Lightware device because the device is connected to the secondary Ethernet adapter (cross UTP connection), you need to disable the primary adapter (Internet). This way the Ethernet adapter which is connected to the Lightware device will become the primary adapter and the Bootloader can query it for Lightware devices. If you disable an Ethernet adapter while the

Bootloader is running, you need to restart the Bootloader to be able to query the Ethernet adapter again.

A second option in this case is that if you know the IP address and port number of the Lightware device, you may use the Add IP button which is described in section *10.2.2* on page *72*.

Upgrade FAILED

If the connection is unreliable and the Bootloader cannot communicate with the Lightware device, then the ***"Upgrade failed!"*** warning messages appears.

The Bootloader retries the transmission 3 times. If it doesn't succeed, then the upgrade procedure will have FAILED. In this case exit the Bootloader, try to establish a reliable connection with the Lightware device and repeat the upgrade process. It may happen that when you try to find the device again, the Available devices window will only show the IP address of the Lightware device but not the device type and serial number. The reason for this is that the Lightware device may still be in bootload mode and the controllers cannot send any information about themselves. You can still double-click on the IP address and the Bootloader will establish the connection.

No controller selected to upgrade!

If you didn't check any checkboxes left to the controller types then the ***"No controller selected to upgrade!"*** message appears. Click at least one of the checkboxes before you click on the UPGRADE SELECTED FIRMWARES button.

The controller was not upgraded

Make sure that the checkbox next to the controller type is checked before you click on the ***UPGRADE SELECTED FIRMWARES*** button. These checkboxes enable the firmware upgrade on the different controller types.

An invalid file has been selected

The Bootloader checks if valid firmware files have been selected for the controllers. If an invalid file (not firmware file) has been selected, then the ***"WARNING! Upgrade failed: Invalid checksum"*** warning messages appears.

Please select a valid firmware file.

Firmware selected for the wrong controller

If an otherwise valid firmware file has been selected but for the wrong controller, the ***"WARNING! Invalid controller type info for MX16x16DVI-Plus"*** warning message appears.

Please select the appropriate firmware file for the controller.

Corrupt firmware file

If the correct firmware file is selected for the controller but it somehow became corrupted (the checksum is incorrect), then the ***"WARNING! Upgrade failed: Invalid checksum. Invalid controller type info for MX16x16DVI-Plus. Invalid hardware info for MX16x16DVI-Plus."*** warning messages appear.

Please contact your local sales representative or Lightware's support team at support@lightware.eu and ask for the correct firmware files.

12. Specifications

General

Compliance ..... CE, UL, FCC

EMI/EMC ..... EN 55103-1, EN 55103-2

Safety ..... EN 60065 Class I

Warranty ..... 3 years

Cooling ..... Fan, air flows right to left (as viewed from front)

Operating temperature ..... -20°C ~ +50°C

Humidity ..... 10 ~ 90% RH

Power

AC power connector ..... IEC-320 C14 receptacle (filtered)

Power source ..... 100-240 V AC; 50~60 Hz; max 2.1 - 0.9 A

Power supply ..... Internal

	Power consumption [W]		Power need** [W]	Heat dissipation [BTU/h]	
	typ.	max.*	total max.	typ.	max.**
MX16x16DVI-Plus	36	53	93	123	181
MX12x12DVI-Plus	31	44	74	106	150
MX9x9DVI-Plus	27	36	59	92	123

* Maximum values are calculated when DVI +5V supplied for external devices but these values include only the consumption of the matrix itself.

** Total power need from the electric outlet, when all output ports are loaded with 500mA on DVI +5V. Please note that the power supplied for the external devices is not consumed by the matrix itself but it is needed from the electric outlet.

Enclosure

Rack mountable ..... Yes, 4U high

Material ..... 1 mm steel

Dimensions in mm ..... 482*/440W x 159.8D x 176.5H mm

Dimensions in inches ..... 19*/17.3W x 6.3D x 7H inch

Net Weight ..... 5000 g (11 lbs) / product

* with rack mounting ears

Inputs

Connectors ..... 29-pole DVI-I digital only

Input cable equalization ..... Yes, +12dB fixed

EDID emulation ..... Yes, for each input connector

Outputs

Connectors ..... 29 pole DVI-I digital only

Output preemhasis ..... Yes, +6dB fixed

Reclocking ..... No

+5V output current ..... 500 mA continuous on each output

Signal

Data rate: ..... all between 25 Mbps and 2.25 Gbps / TMDS channel

Channels: ..... 1x TMDS Clock + 3x TMDS Colors

Resolutions: all between 640x480 and 1920x1200@60Hz or 2048x1080@60Hz

Color depth: ..... maximum 36 bits, 12 bit/color

Color format ..... RGB, YCbCr 4:4:4

HDTV resolutions: 720p, 1080i, 1080p

HDMI 1.3a compatible: ..... Yes (embedded audio)

HDCP compliant: ..... No

Video delay ..... 0 frame

EDID Support ..... Advanced EDID management

EDID Emulation ..... Yes, 50 factory preset, 50 user programmable

Resolution	Vertical frequency (Hz)	Horizontal frequency (KHz)	TMDS Clock frequency (MHz)	Comment
640x480	60.00	31.47	25.18	**DOS VGA**
800x600	60.32	37.88	40	**VESA SVGA**
800x600	75.00	46.87	49.5	**VESA SVGA**
832x624	74.55	49.72	57.29	**MACINTOSH**
1280x720	60.00	45.00	74,25	**HDTV 720p**
1024x768	60.00	48.36	65	**VESA XGA**
1024x768	75.00	60.02	78.75	**VESA XGA**
1360x768	47.7	60.00		**WIDE-XGA**
1152x870	75.06	68.68	100	**MACINTOSH**
1280x1024	75.00	80.00	135.00	**VESA SXGA**
1400x1050	60.00	65.64	121.82	**SXGA+**
1920x1080i	60.00	67.50	74.25	**1080i**
1920x1080	60.00	67.50	148.5	**HDTV 1080p**
1920x1080	60.00	67.50	185.6	**1080p 10bit**
1920x1080	60.00	67.50	222.75	**1080p 12bit**
2048x1080	60.00	67.50	157.3	**2K**
1600x1200	60.00	75.00	162	**VESA UXGA**
1920x1200	60.00	75.00	162	**VESA**

Table 12-1. DVI timing examples for some typical supported resolutions

Control

Front Panel buttons..... Yes, 37 buttons

Serial port connector..... 9 pole D-SUB female RS-232 or RS-422

Baud rate ..... 9600 Baud, 8 bit, 1stop bit, no parity

Ethernet port connector ..... Neutrik EtherCON, RJ45 female connector

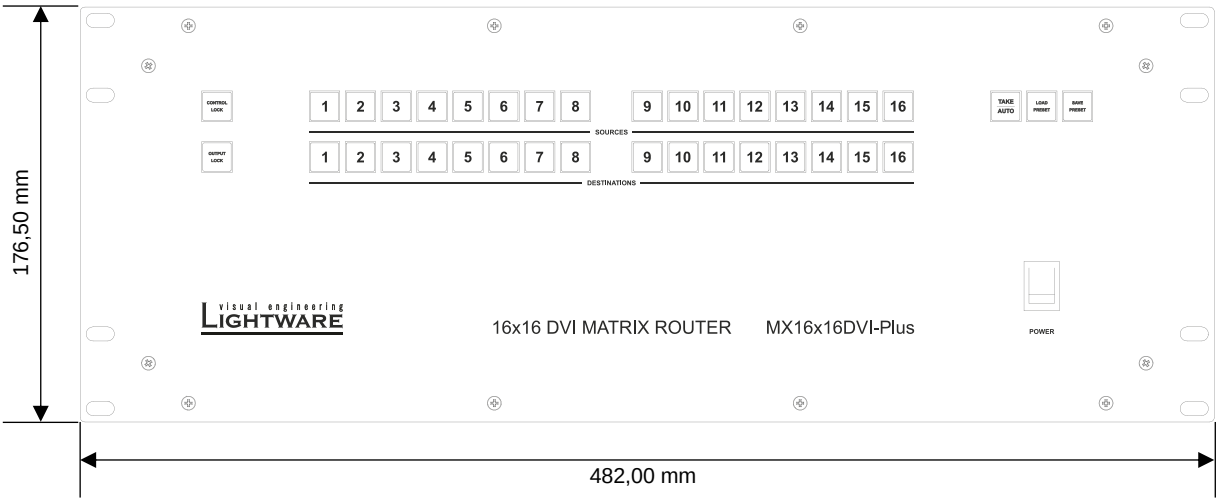
Ethernet protocol..... TCP/IP, HTTP, TFTP, Telnet

IP address assignment ..... fixed, DHCP, BOOTP, and AutoIP

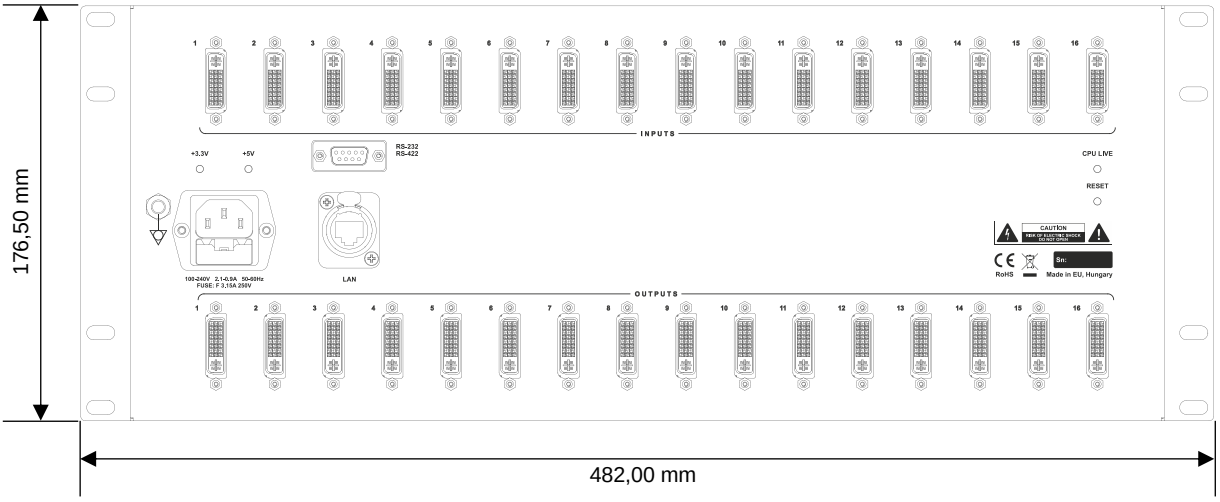
13. Mechanical Drawings

13.1. MX16x16DVI-Plus

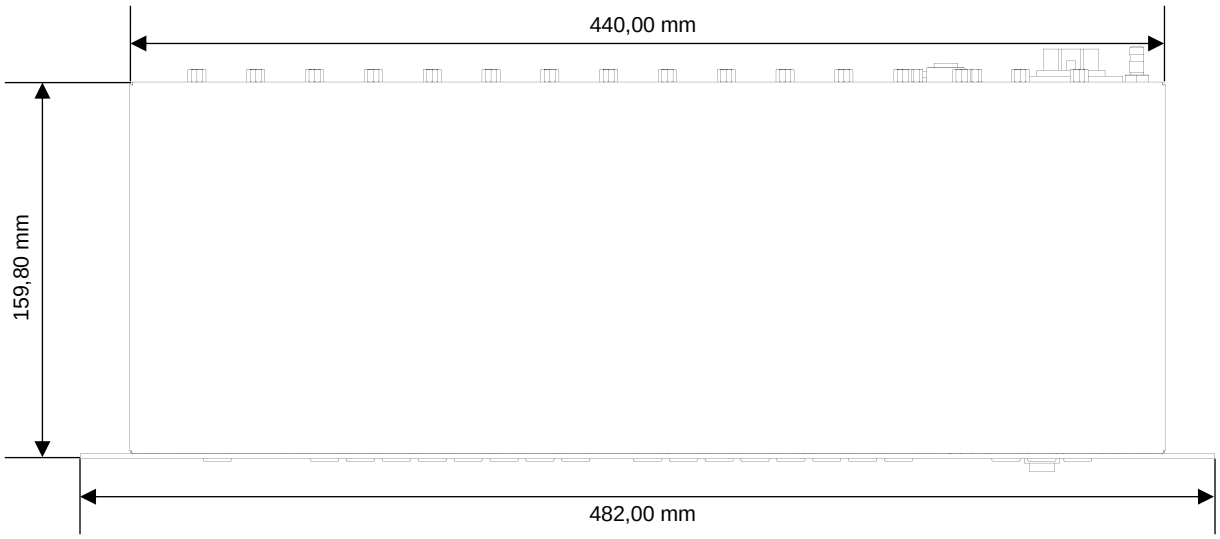
Front View



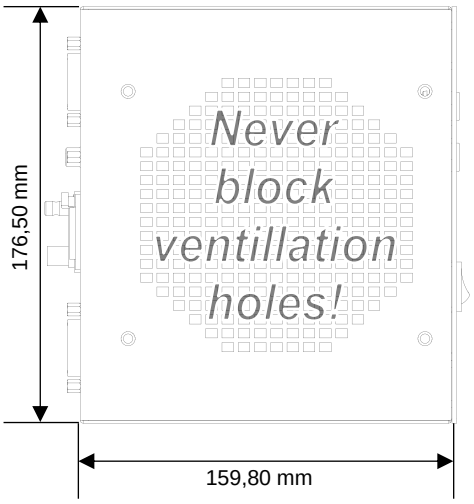
Rear View



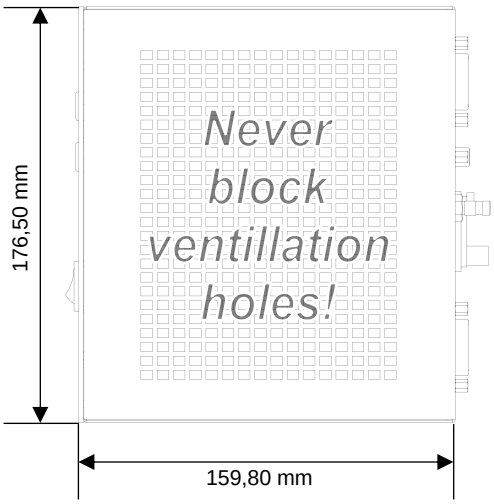
Top View



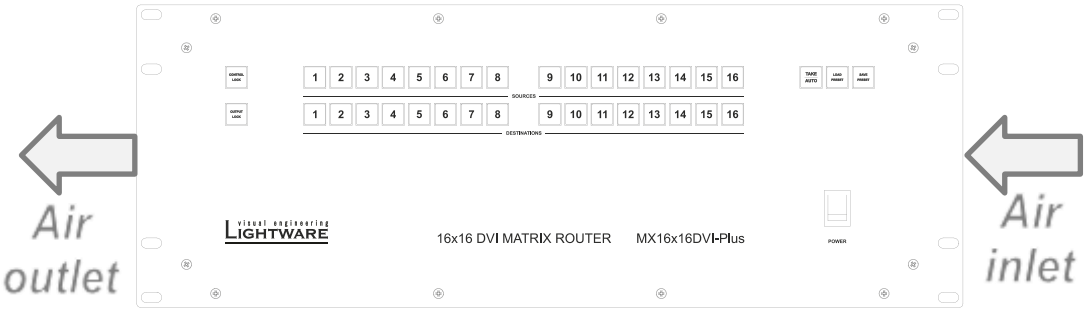
Left View

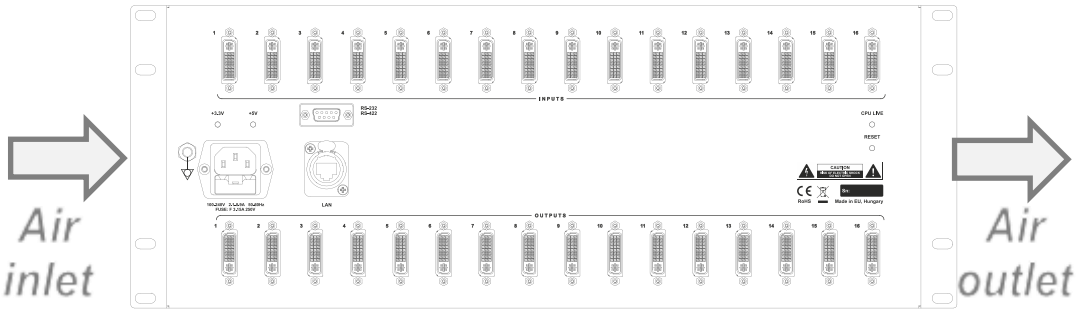


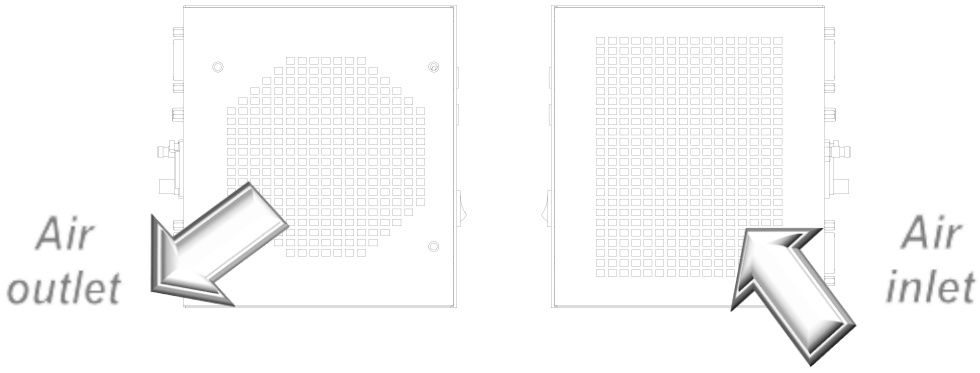
Right View



Airflow directions

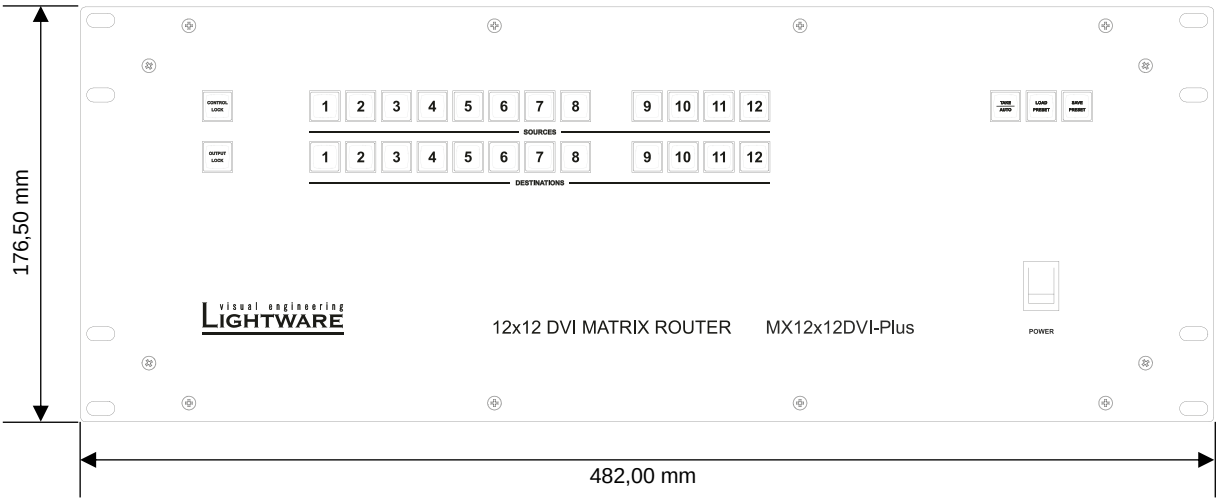




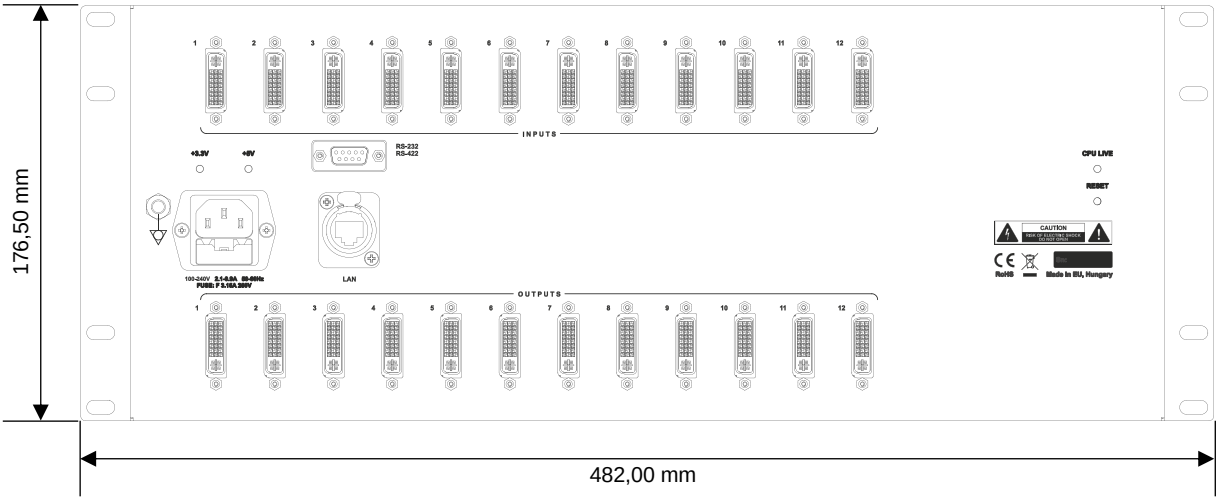


13.2. MX12x12DVI-Plus

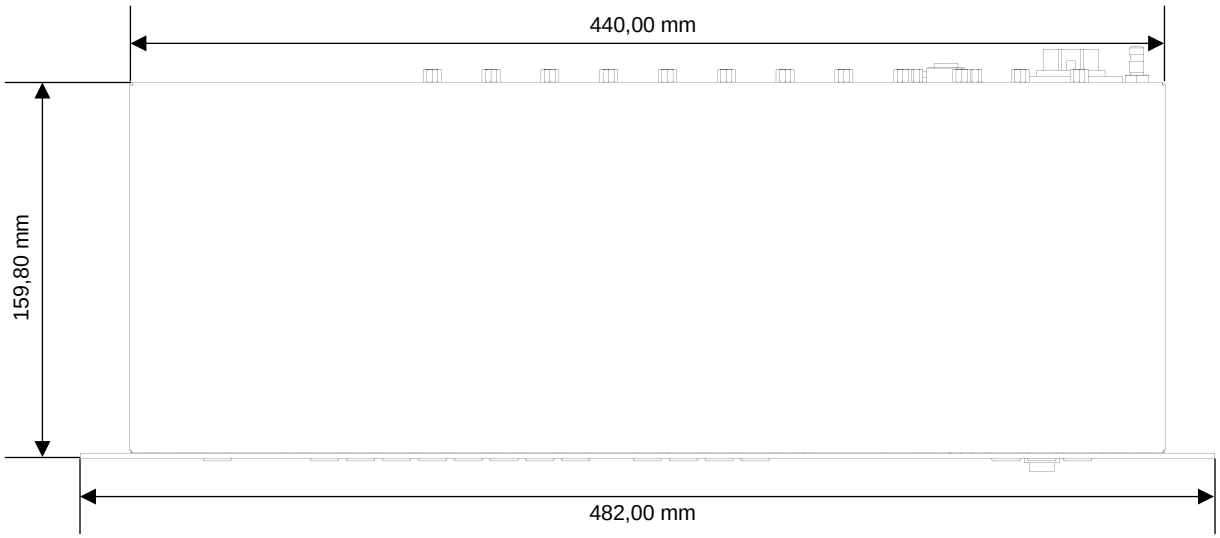
Front View



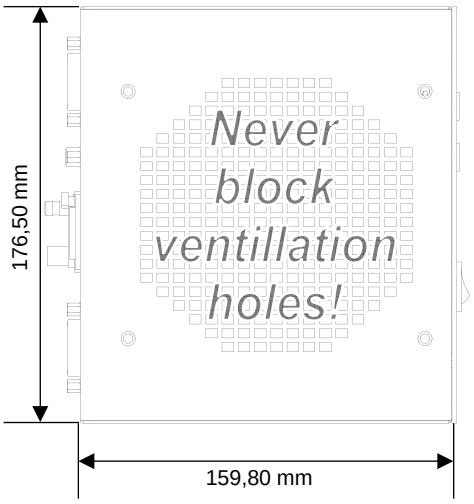
Rear View



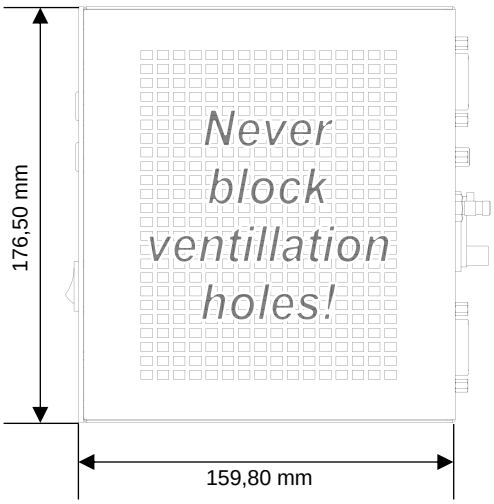
Top View



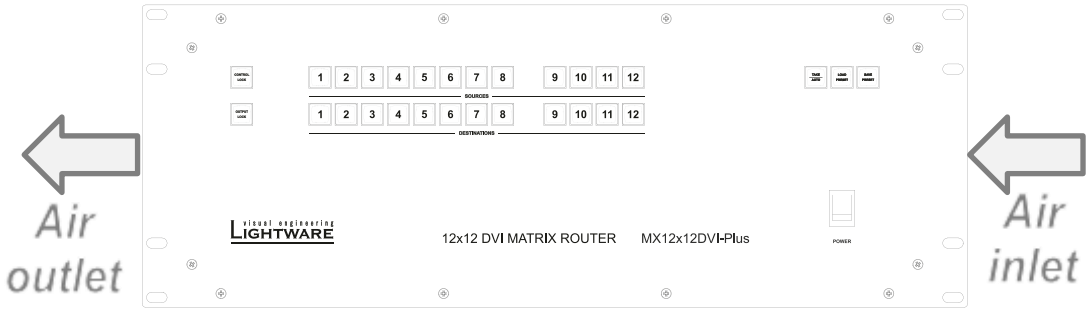
Left View

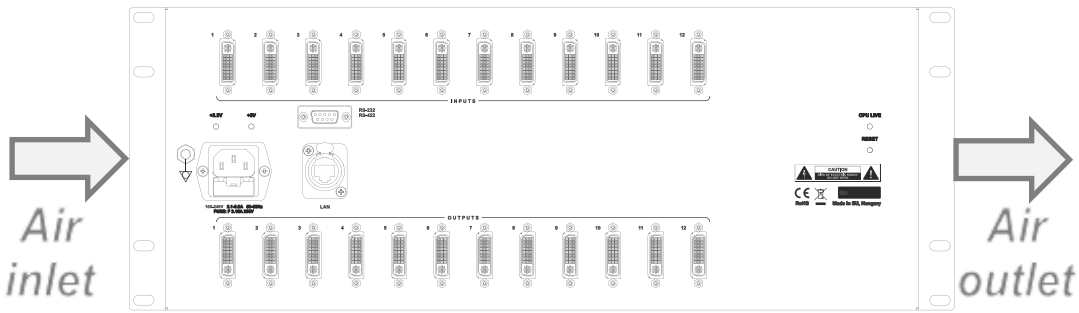


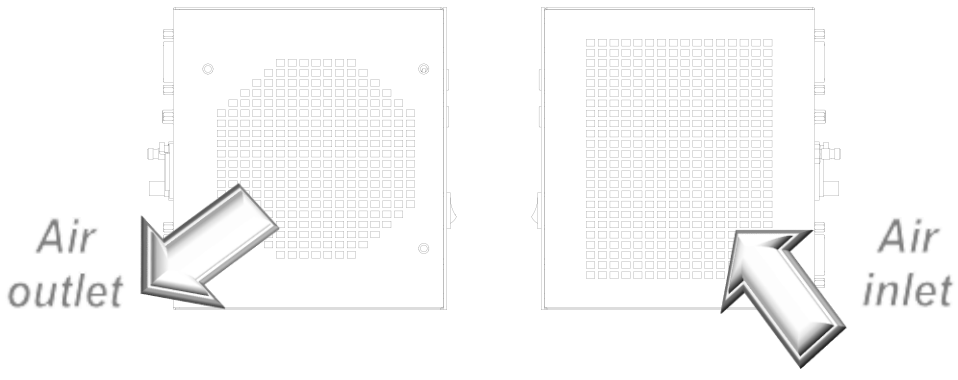
Right View



Airflow directions

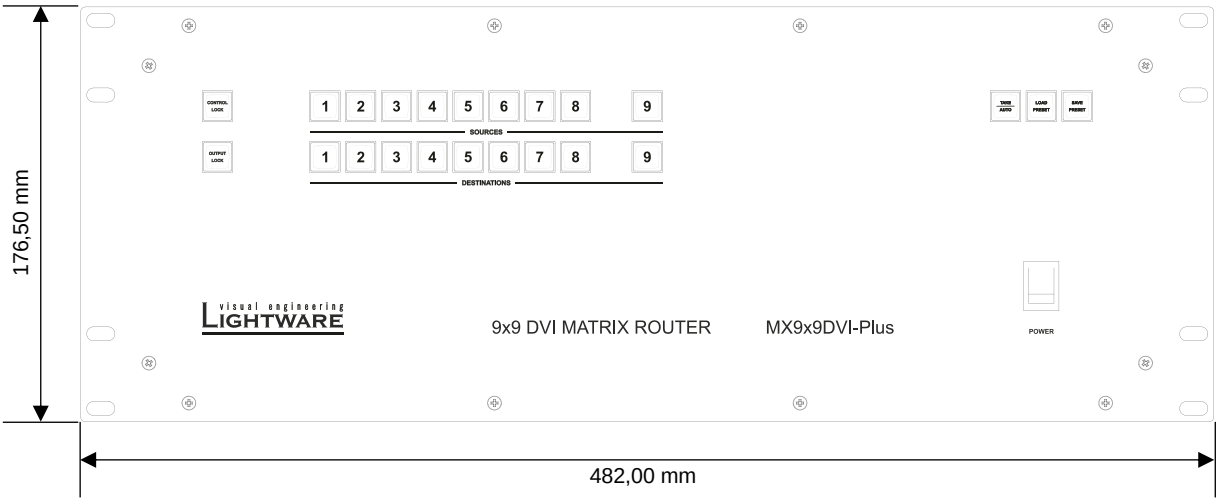




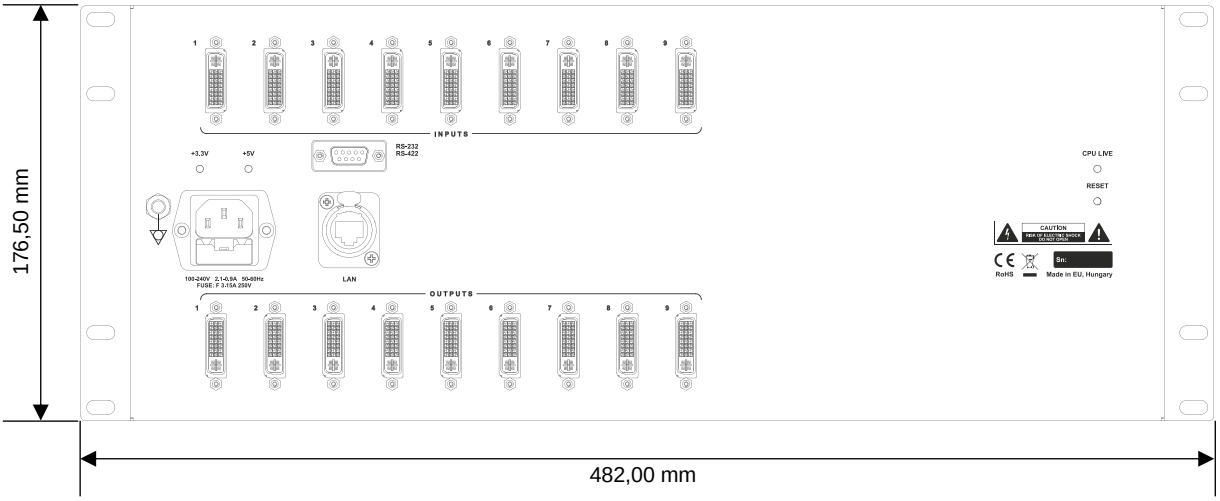


13.3. MX9x9DVI-Plus

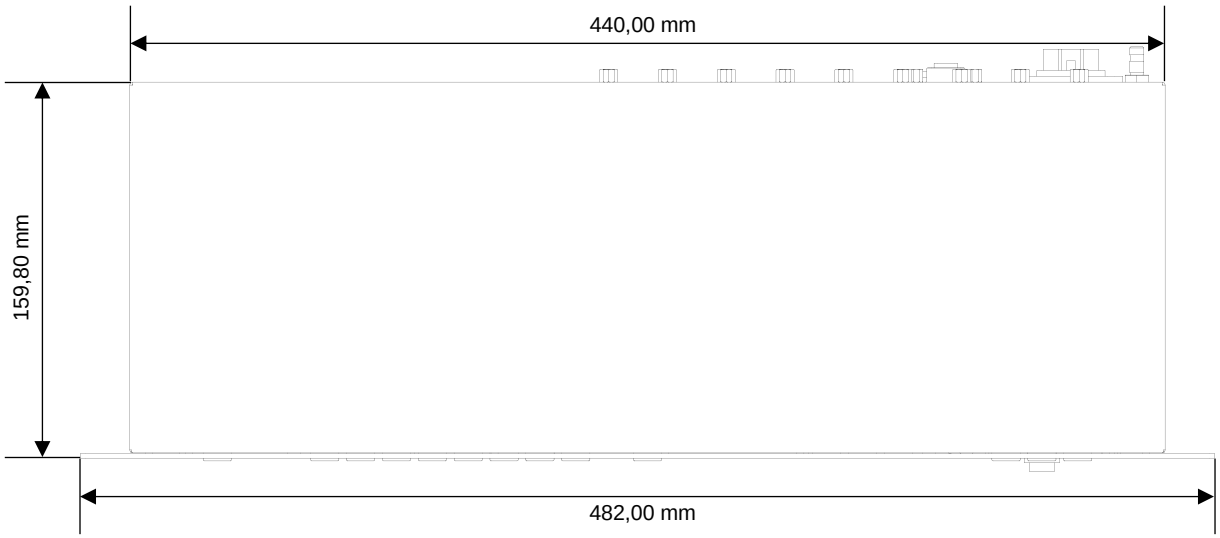
Front View



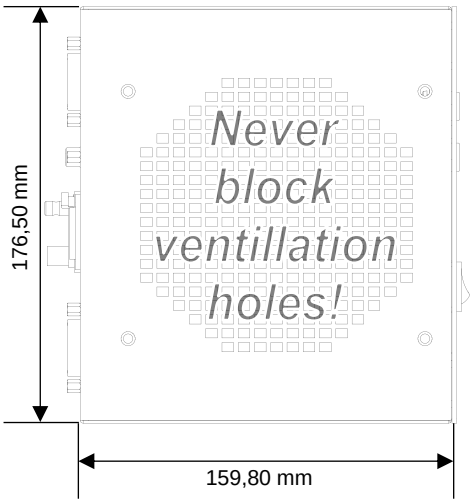
Rear View



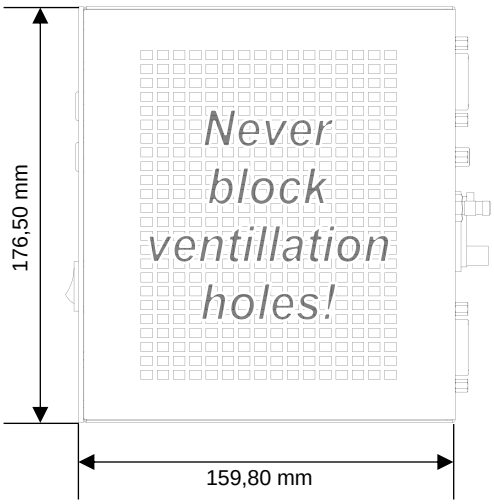
Top View



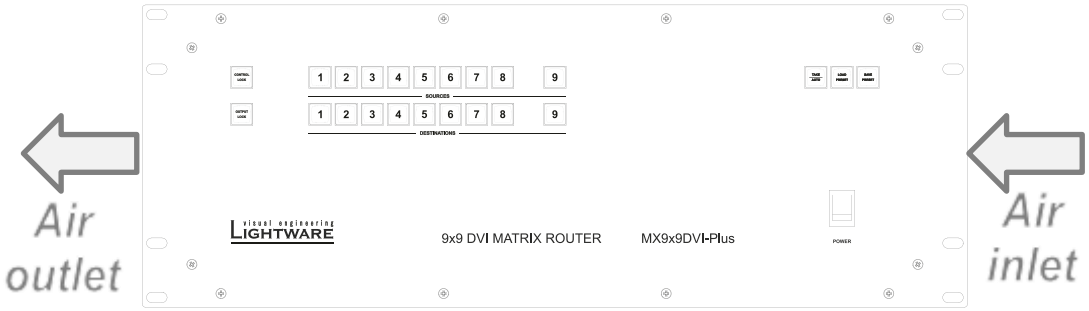
Left View

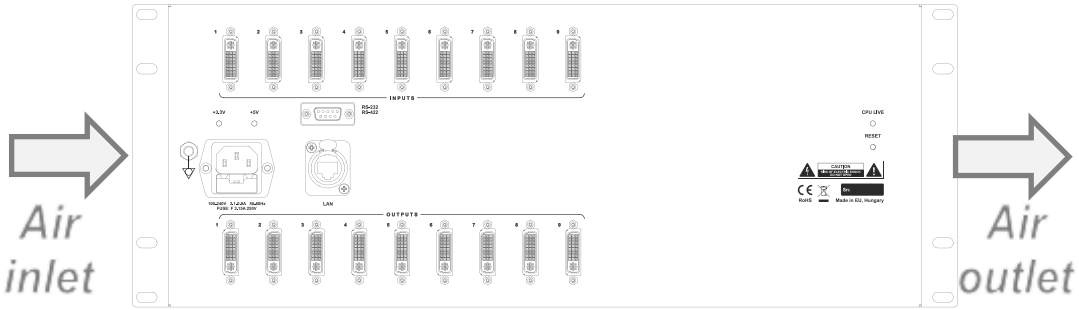


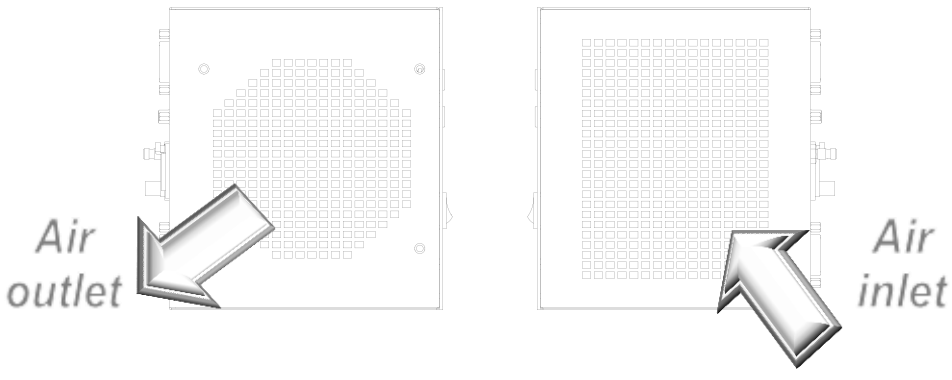
Right View



Airflow directions







14. Version applicability

This User's Manual applies to the following versions of the mentioned software, firmware and hardware:

	version
Lightware Matrix Controller software	3.4.2
Lightware Bootloader software	3.2.8
router CPU firmware (MX-CPU)	2.4.8
router Control Panel firmware (MX-CP)	1.0.8
router EDID firmware (MX-DVI-EDID)	3.3.3
router MOTHERBOARD	SCH: 2.5 PCB: 2,5
router Control Panel hardware SCH	SCH: 2.1 PCB: 2.1
router Web Content	1.4.0
router Web Server	1.10.0
router enclosure MX16x16DVI-Plus	416-101-220
router enclosure MX12x12DVI-Plus	419-101-100
router enclosure MX9x9DVI-Plus	420-101-100

15. Warranty

Lightware Visual Engineering warrants this product against defects in materials and workmanship for a period of three years from the date of purchase.

The customer shall pay shipping charges when unit is returned for repair. Lightware will cover shipping charges for return shipments to customers.

In case of defect please call your local representative, or Lightware at

Lightware Visual Engineering

15 Peterdy Street, Budapest H-1071, HUNGARY

Tel.: +36 1 889 6177

Fax.: +36 1 342 9903

E-mail: support@lightware.eu

16. Quality Check Record

Model name	Serial number	Date of manufacture	Checked

Hardware

Module	Hardware	Firmware
Mother board		
CPU		
EDID management		
LAN control server		
WEB content		
MAC address	: : : : :	
Control Panel		
Power supply		

Electrical check

GND/EARTH Safety	☐	Inputs	☐
+3.3V; +5V	☐	Outputs	☐
CPU Live	☐	RS-232	☐
Buttons	☐	LAN	☐

17. Document revision history

Document	Release Date	Changes	Checked by
Rev. 1.0	28-09-2012	Initial version	Zsolt Marko